Kentucky's Wonderful Commonwealth of Water

Primary Unit

Be a Water Explorer

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Primary Unit

UNIT SUMMARY

This unit addresses the basics. What is water? What forms can it take? How does it behave? Why is it important to us? It culminates with students learning the best ways to conserve water and then teaching their families the same skills.

Some of the big ideas in this unit include the following.

- Water is all around us.
- Water comes in three "states" - liquid, solid and gas.
- Water has specific physical properties.
- Water cycles through the earth's atmosphere and crust.
- Various objects float or sink in water according to their density.
- All living things need water to survive.
- Certain human activities can pollute water.
- Certain human activities can prevent water pollution.
- There are simple and effective ways to conserve water.

Suggested Open Response Question - Your community is experiencing a severe drought. It has not rained in three months. Describe two problems this might cause in your community and how they might be solved.

Portfolio Suggestions - Expand on the "Freddy the Fish" activity by asking students to write a newspaper account of how Freddy got sick and how the community worked to save him. Have students write a lab report outlining their findings in the "What Makes Water, Water" activity.

Technology Extensions

- Have students take (or draw) pictures of different water features in your community. Scan the pictures onto a computer disk and have students create a PowerPoint presentation using the photos and drawings. (Note: digital cameras can be used if they are available.)
- Have students use water testing kits to assess water quality in a nearby stream or pond, then use computers to graph their findings.
- Have students write poems or stories about water and use word processing software to type and illustrate them.

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Essential Question: What is water and why is it important?

Standards

Science

Science SC-E-2.1.1, Students will understand that earth materials include solid rocks and soils, water, and the gases of the atmosphere.
Science S C-E-1.1.1, Students will understand that materials have many observable properties such as size, mass, shape, color, temperature,...and the ability to react with other substances.
Science SC-E-1.1.2, Students will understand that properties (e.g., size, shape) of materials can be used to describe, separate, or sort objects.
Science SC-E-1.1.3, Students will understand that materials can exist in different states and some common materials, such as water, can be changed from one state to another by heating and cooling.
Science SC-E-3.1.2, Students will understand that organisms have basic needs (e.g., air, water, nutrients, light) and can only survive when those needs are met.
Science SC-E-3.3.3, Students will understand that all organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to other organisms, other changes are beneficial.

Arts and Humanities

Arts and Humanities AH-E-4.1.4, Students will create artwork using the elements of art and principals of design.
Arts and Humanities AH-E-2.1.12, Students will create movement patterns using locomotor and non-locomotor movement.

Social Studies

Social Studies SS-E-4.1.1, Students will use tools (e.g. maps, globes, charts, graphs, compasses) to understand surroundings.
Social Studies SS-E-4.4.2, Students will recognize that people depend on, adapt to, or modify the environment to meet basic needs.

Practical Living

Practical Living PL-E-3.1.5, Students will understand that there are consumer decisions (e. g., reducing, recycling and reusing) that have positive impacts on the environment.

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Practical Living (cont.)

Practical Living: PL-E-3.3.2, To protect all citizens, there are community guidelines (e.g., school inspections, trash collection, water treatment, waste treatment, animal control, immunization) that promote healthy living environments in the community.

Reading

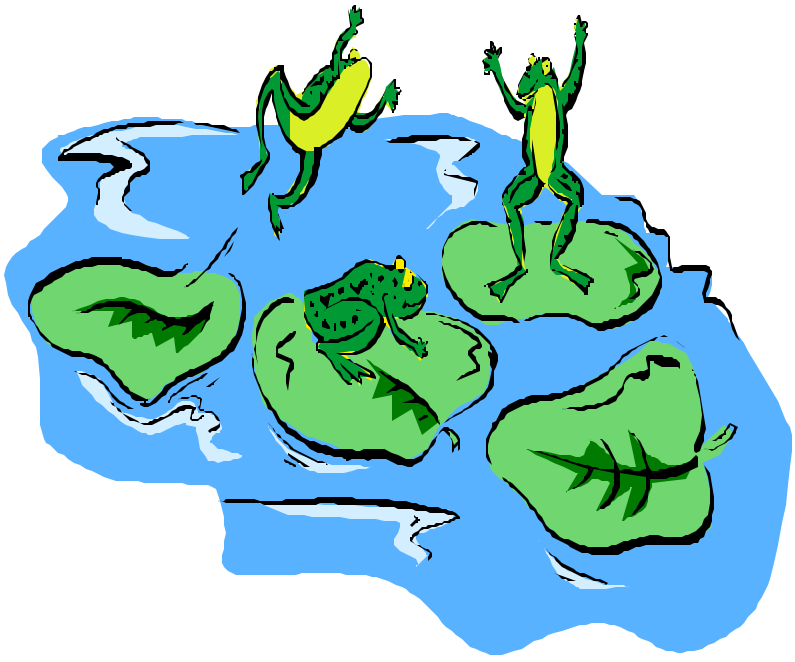
Reading: R D-E-4.0.6, Students will read a variety of materials to accomplish authentic purposes including reading for enjoyment, to locate information, and to complete tasks.

Math

Math: MA-E-3.2.1, Students will pose questions, collect, organize, and display data.

Writing

Writing: WR-E-1.4, Students will write an informative and persuasive letter for an authentic audience to accomplish realistic purposes.



Unit Overview	
Lesson	**Title and Description of Activities, Essential and Guiding Questions and Standards**
#**1**	**"Let's Take a Water Walk"**-Students will go for a walk outside and use their senses to observe and record sources of water and how it is affecting the surrounding area. They will also paint pictures showing where water can be found and create water logs. **Standards:** Arts and Humanities AH-E-4.1.4 **Essential Question:** What is water and why is it important? **Guiding Question:** • Where do you see signs of water being used in our community? • How is our immediate environment affected by water?
# 2	**"So Much ...Yet so Little"**-Students will use globes, maps and "apples" to explore the amount of land and water found on Earth. **Standards:** Science SC-E-2.1.1 and Social Studies SS-E-4.1.1 **Essential Question:** What is water and why is it important? **Guiding Question:** • How much of our world is water? • How much of this water is fresh water?
# 3	**"What Makes Water Water?"-**Students will explore the physical characteristics of water by comparing water with other clear liquids. **Standard:** Science S C-E-1.1.1 **Essential Question:** What is water and why is it important? **Guiding Questions:** • What are some of the properties of water? • What is a liquid?
# 4	**"Tense Water Droplets"-** Students will continue to learn about the physical characteristics of water as they explore water surface tension. **Standard:** S C-E-1.1.1 **Essential Question:** What is water and why is it important? **Guiding Questions:** • What is surface tension? • Why is surface tension important?

Unit Overview	
Lesson	**Title and Description of Activities, Essential and Guiding Questions and Standards**
# 5	**"H2O-Overpowering the Opponents!"-** Students will be introduced to the concepts of cohesion, absorption and flow as they further explore water in its liquid state and participate in water races. **Standards:** Science S C-E-1.1.1 and Science SC-E-2.1.1 **Essential Question:** What is water and why is it important? **Guiding Questions:** • What is a water molecule? • Why is cohesion important in the flow of water? • Why is surface tension important to the flow of water? • What role does gravity play in the flow of water?
# 6	**"Water Ups and Downs"-** Students will explore water density by using common objects to design floating and sinking experiments. **Standard:** Science SC-E-1.1.2 **Essential Question:** What is water and why is it important? **Guiding Questions:** • What is density? • Why do some objects float and other objects sink in water? • How does salt affect the density of water?
# 7	**"What's the Matter?'**- Students will explore water as a liquid, solid and gas. **Standard:** Science SC-E-1.1.3 **Essential Question:** What is water and why is it important? **Guiding Questions:** • Water can exist in what three forms of matter? • What causes water to change its form? • Why is it important for water to be able to change forms?
# 8	**"Constantly Changing Water Molecules"-**Students will explore water as a liquid, solid and gas through movement. **Standards:** Arts and Humanities AH-E-2.1.12 and Science SC-E-1.1.3 **Essential Question:** What is water and why is it important? **Guiding Questions:** • What three forms of matter can water become? • What causes water to change its form?

Unit Overview	
Lesson	**Title and Description of Activities, Essential and Guiding Questions and Standards**
# **9**	**"Where Does All the Water Go?"-** Students will make puzzles showing the water cycle at work to share with their classmates and families. **Standards:** Arts and Humanities AH-E-4.1.4 and Science SC-E-1.1.3 **Essential Question:** What is water and why is it important? **Guiding Questions:** • What 3 forms of matter can water become and how does it relate to evaporation, condensation, and precipitation? • How does water travel around the Earth? • Where does all of this water come from?
# 10	**"A Journey Through the Water Cycle"-** Students will journey through the water cycle as clouds in this interactive lesson. **Standard:** Science SC-E-1.1.3 **Essential Question:** What is water and why is it important? **Guiding Questions:** • What 3 forms of matter can water become and how does that relate to evaporation, condensation, precipitation, accumulation and transpiration? • How does water travel around the Earth?
# 11	**"To See is to Believe"-** Students will make a mini-model of the water cycle using 2-liter soda bottles in order to observe evaporation, transpiration, condensation, precipitation and infiltration taking place. **Standards:** Science SC-E-1.1.3 and Science SC-E-3.1.2 **Essential Question:** What is water and why is it important? **Guiding Questions:** • What are the signs of the hydrologic cycle in the real world? • How does the model show what happens in the hydrologic cycle?
#12	**"Survival Needs"-** Through observation, discussion and research, students will report on the needs of plants and animals. **Standards:** Science SC-E-3.1.2 and Reading RD-E-4.0.6 **Essential Question:** What is water and why is it important? **Guiding Questions:** • What do plants and animals need to survive?

Unit Overview

Lesson	Title and Description of Activities, Essential and Guiding Questions and Standards
# 13	**" A Fishy Tale"-** Students will be introduced to point and nonpoint sources of pollution as they take a trip with a pretend fish in a pretend river during this simulation activity. **Standards:** Science SC-E-3.1.2 and Science SC-E-3.3.3 **Essential Questions:** What is water and why is it important**?** **Guiding Questions:** • What happened in this activity to change the fish's environment? • In our community what might pollute water? • What can we do to clean up the water before disposing of it?
#14	**" Filtering Away Pollutants"-** Students will discover ways to filter "polluted" water, then learn about natural filters in the environment, and wastewater treatment plants. **Standards:** Science SC-E-3.3.3 , Social Studies SS-E-4.4.2 and Practical Living PL-E-3.3.2 **Essential Questions:** What is water and why is it important? **Guiding Questions:** • Where do we get the water we use for personal consumption? • How can dirty water be cleaned? • How do we know water in our community is purified and safe to drink?
# 15	**" The Water Patrol"-** Students will mark the places where water is used on a school map, discuss the different uses of water in the building, estimate the amount of water used daily to flush toilets in one student restroom, collect data for a predetermined amount of time and analyze that data. **Standards:** Math MA-E-3.2.1, and Social Studies SS-E-4.1.1 **Essential Question:** What is water and why is it important? **Guiding Questions:** • How much water do you think is used at school during a typical day? • Why is water conservation important?

Unit Overview

Lesson	Title and description of Activities, Essential and Guiding Questions and Standards
#16	**"Concerned About Conserving Water" -** Students will develop a survey to use to collect and analyze information about how much water their families use during a typical day at home. **Standards:** Math: MA-E-3.2.1 and , Practical Living: PL-E-3.1.5 **Essential Question:** What is water and why is it important? **Guiding Questions:** • How much water do you think is used at home during a typical day? • How can we find out this information? • What can you and your family do to conserve water?
#17	**"Water" You Gonna Do About It?"-** Students will review information covered during the water unit and use some of that information to write a letter to family members telling what they learned about water and suggesting ways to conserve water at home. **Standards:** Practical Living PL-E-3.1.5 and Writing WR-E-1.4 **Essential Questions:** What is water and why is it important? **Guiding Questions:** • What are the most important things about water you want to remember? • Why is it important to conserve water? • What, specifically , can you and your family do to conserve water?

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

Let's Take a Water Walk

Standards

Arts and Humanities: AH-E-4.1.4, Students will create artwork using the elements of art and principles of design.

Activity Description

Students will go for a walk outside and use their senses to observe and record sources of water and how it is affecting the surrounding area. They will also paint pictures showing where water can be found and create water logs.

Materials

- Water learning logs for each student
- Poster board or drawing paper
- Clipboards (optional)
- Art supplies
- Pencil for each student

Length of Lesson

2 days, approximately one hour each day

Vocabulary Word

Environment—the external conditions that influence the development and survival of an organism or population; usually refers to air, water, land, plants and animals.

Essential Question

What is water and why is it important?

Guiding Questions

- Where do you see signs of water being used in our community?
- How is our immediate environment affected by water?

Skills Used

Observe, Record, Write, Draw, Discuss, Analyze

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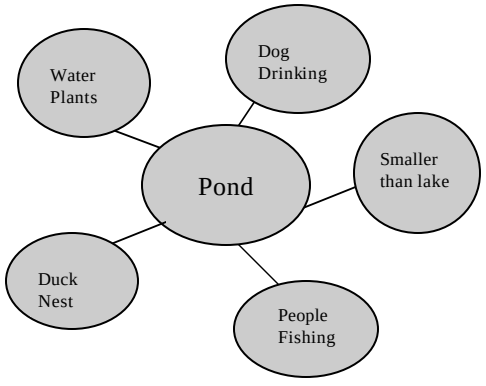
Activity

Step 1: Before beginning this unit, prepare water learning logs for students to use to write observations, thoughts, predictions and reflections. Students may wish to decorate the water learning logs prior to their first use.



Day 1

Step 2: Explain to students that the class is going to be studying about water and will begin the unit by going for a walk outside in order to look for signs of water and its effects on the surrounding environment.

Let's Take a Water Walk, *continued*

Step 3: Tell students that they will be using their senses to make observations of water at work (example: puddle, downspout, sewer, garden hose, pool, dew, etc.). Each sign of water should be recorded, using words and/or pictures, along with how the water source is affecting the environment. Students may wish to organize this information by using individual thought webs. Distribute water learning logs and pencils.

Step 4: Return to the classroom and invite students to share their findings. As each student gives examples of sources of water found outside, record the basic ideas on pre-cut water droplets. Students should also be encouraged to share information they know about water at this time, including places around the world where water can be found. This is the beginning of the KWL (What I Know, What I Want to Learn, and What I Have Learned) Chart. As the unit progresses, the number of water droplets posted on the wall in the classroom will increase.

Step 5: Record on sentence strips any questions that arise during the discussion. Post these strips in the classroom for future exploration and study. This should continue throughout this unit of study.

Step 6: Give students an opportunity to record any reflections or "Ahaas" (new things learned about water) in their new learning logs at the conclusion of this lesson.

Primary Unit

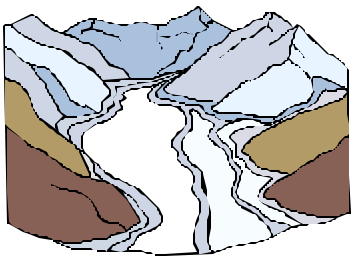
Day 2

Step 1: Review water sources discussed yesterday. Have students choose one water source found in their water learning logs, or on the water droplets hanging on the wall, to illustrate and label on a piece of poster board or large sheet of construction paper. Encourage students around the classroom to choose different water sources and to add many details to their drawings. Color and decorate the posters.

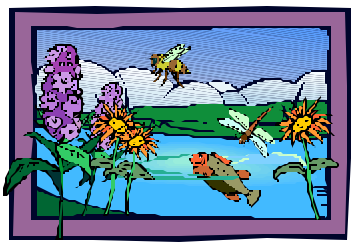
Step 2: After the posters have been completed, display them in the classroom or hallway until they are needed in a later lesson.

Primary Landscape Poster Examples

Use with students who have difficulty visualizing scenes to draw.

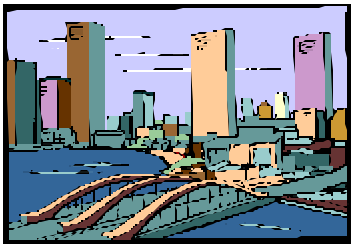


Glacier

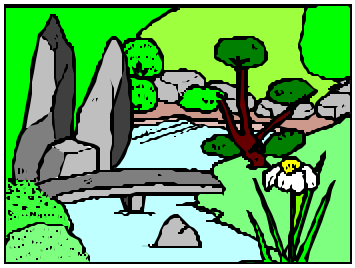


Lake

Waterfall



City

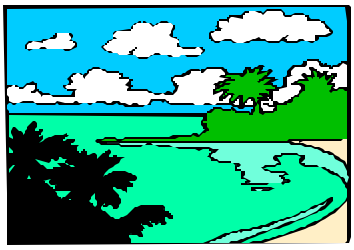


Stream or Creek

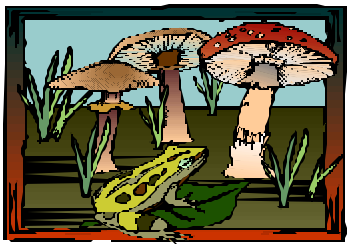
Farm

Neighborhood

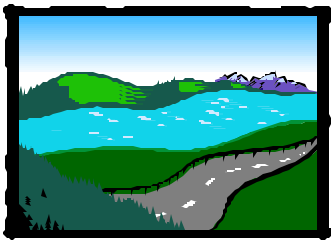
Iceberg



Ocean

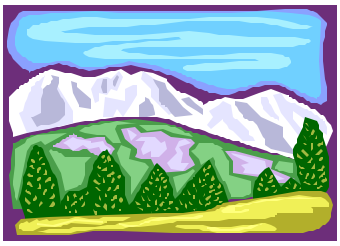


Wetland, Marsh

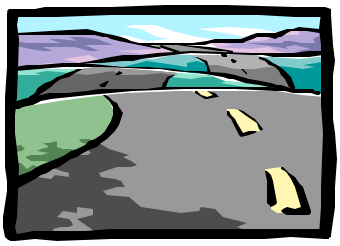


River

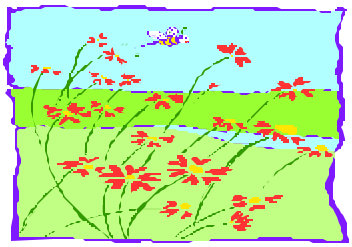
Snowy Hillside



Mountains



Puddle



Field, Meadow

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

So Much . . . Yet So Little

Standards

Science: SC-E-2.1.1, Students will understand that earth materials include solid rocks and soils, water, and the gases of the atmosphere.
Social Studies: SS-E-4.1.1, Students will use tools (e.g. maps, globes, charts, graphs, compasses) to understand surroundings.

Activity Description

Students will use globes, maps and "apples" to explore the amount of land and water found on Earth.

Materials

- Globes, maps and/or atlases
- Apples (the number needed depends on how the lesson is structured)
- Plastic knives for children, or one knife for teacher

Length of Lesson

30 minutes

Vocabulary Words

Topography map—map that shows the land and water contours and elevations, and is reproduced from satellite pictures.
Fresh water—inland water that has a low concentration of minerals, salts, and dissolved solids found as surface water or ground water.

Essential Question

What is water and why is it important?

Guiding Questions

- How much of our world is water?
- How much of this water is fresh water?

Skills Used

Observe Visualize Compare Communicate

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Activity

Step 1: Distribute globes, maps (including **topography maps** of your area if you have them), and atlases. Explore and discuss the water and land masses. Encourage students to share insights about discoveries.
*Use the Internet sites, such as **http://www.ngdc.noaa.gov/seg/topo/state.shtml** , **http://www.usgs.org/** or **http://www.kygs.org .**for access to topography maps. Students will be delighted to see all of the hills and water sources in their own communities.

Step 2: Distribute apples and plastic knives to partners (or the teacher may do this activity as a demonstration for very young students). Explain to students that they will not be eating these apples, but using them for a class activity. (Let students know if there will be extra apples for eating later.)

So Much . . . Yet So Little, *continued*

Step 3: Ask students how the apple is like a globe. Once the connection of the apple being a model of the globe is made, have students divide the apple in half, then in half again, creating quarters. Explain that three of the slices are the blue on our map that represents salt water. One slice represents the land and its freshwater. (At this point of the lesson we want to make sure that the students understand there is a lot more water than land.) Put the three slices representing salt water aside.

Step 4: Concentrate on the fourth remaining piece of the apple that represents land and its water. In an attempt to help students discover that not all of the land on Earth is inhabitable, cut the land piece in half and explain that half of the land is too dry, too wet, too cold or too hot for people (e.g. mountains, deserts, etc.). Lay one of these two pieces of the apple aside.

Step 5: Slice the remaining 1/8 piece of apple into 4 equal pieces. Set aside three of the pieces, explaining to students that only 1/4 of the remaining apple represents land on which we grow food.

Assessment

Class discussion:

You have heard people talk about the large amount of water on Earth, but you have also heard people talk about not wasting water? Why should we not waste water if we have so much?

Step 6: Using the remaining 1/32 piece of apple to show the land on earth that can be used to grow food, instruct students to take their knives and shave off a paper-thin slice of apple (approximately 1/3200). Explain that this sliver represents usable **fresh water**.

Step 7: Ask students for suggested facts or discoveries to add to the water droplets that are displayed in the classroom. If there are any questions, add them to sentence strips to post on the classroom wall.

Step 8: Give students an opportunity to reflect on their learning in their water learning logs. Pass out pieces of apples for the students to eat as they write in their learning logs.

Extensions

1. Visit http://wwwga.usgs.gov/edu/mearth.html to find web pages to bookmark for students to use for further investigations about fresh water on Earth.
2. Encourage students to begin thinking about why it is so important to conserve water instead of wasting it.
3. For a lesson in probability, use an inflatable plastic globe and toss it from student to student. Keep a tally of what the right thumb touches each time the globe is caught — LAND or WATER. Graph the results. Discuss why the right thumb landed on water more frequently than on land.

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What Makes Water ,Water?

Standard

Science: SC-E-1.1.1, Students will understand that materials have many observable properties such as size, mass, shape, color, temperature, . . . and the ability to react with other substances.

Activity Description

Students will explore the physical characteristics of water by comparing water with other clear liquids.

Materials

- Water
- Glycerin or mineral oil
- Clear containers with lids to hold liquids
- Water learning log
- Isopropyl alcohol
- Toothpicks
- Wax paper
- Pencil

Length of Lesson

Approximately 45 minutes

Vocabulary Words

Liquid—a free flowing substance that takes the shape of its container.
Property—a characteristic of a material or object: something that you can observe such as color, smell, or taste.
Water—a colorless, odorless, tasteless liquid that is essential to plant and animal life.

Essential Question

What is water and why is it important?

Guiding Questions

- What are some of the properties of water?
- What is a liquid?

Skills Used

Observe	Analyze	Organize	Compare
Communicate	Graph	Write	Experiment

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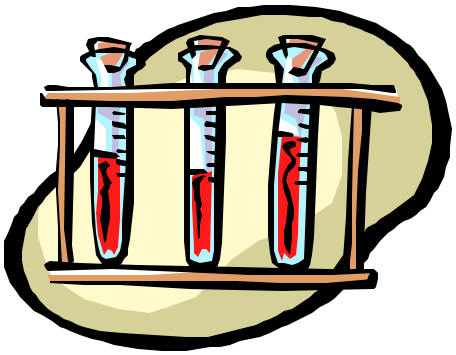
Activity

Step 1: Prior to beginning this lesson, gather the materials listed above. Label each container to show the liquid it contains. It is recommended that this activity be done in small groups, with a set of liquid samples for each table of students. This type of experiment allows students to make discoveries on their own. This activity can also be conducted as one large group, with the teacher demonstrating while students watch, if supplies are limited. (**Teacher Fact Sheets** contain background information on water characteristics.)



What Makes Water, Water, *continued*

Step 2: Explain to students that they will be observing the physical properties of the liquids in the different containers by dropping small amounts onto pieces of wax paper. Explain that each student will be recording observations in their water learning logs, and comparing the properties using a Venn Diagram model. (Review a Venn Diagram, if necessary, with older students. Do the diagram as a whole group activity with younger students.)

Step 3: Give students an opportunity to discuss their findings. Ask students for discoveries about water to add to the water droplets that are displayed in the classroom.

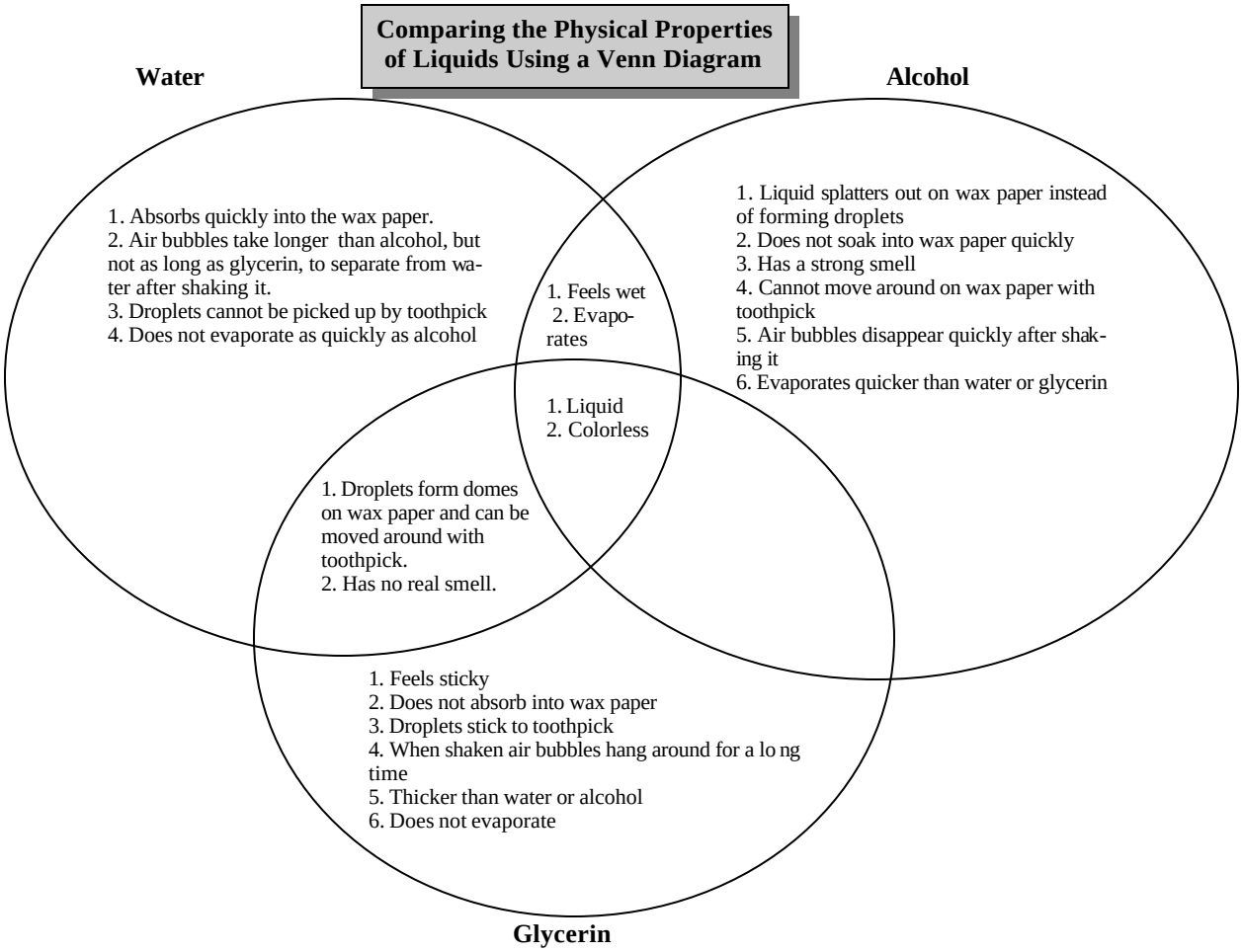
Assessment

Check student's water journals to be sure they have participated in this activity and are beginning to understand the properties of water.

Extensions / Variations

1. Give students who are interested in taking this experiment further, opportunities to compare water to other clear liquids.
2. If working with younger students, try using only two of the liquids (water and glycerin or water and mineral oil).

Comparing the Physical Properties of Liquids Using a Venn Diagram



Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

Tense Water Droplets

Standards

Science: SC-E-1.1.1, Students will understand that materials have many observable properties such as size, mass, shape, color, temperature, . . . , and the ability to react with other substances.

Activity Description

Students will continue to learn about the physical characteristics of water as they explore water surface tension.

Materials

- Clean water
- Class set of pipettes or water droppers
- Water learning log
- One penny per student
- Class set of hand lenses
- Pencil

Length of Lesson

Approximately 30 minutes

Vocabulary Word

Surface Tension—the skin-like surface on water (and other liquids) that pulls it together into the smallest possible area (sphere).

Essential Question

What is water and why is it important?

Guiding Questions

- What is surface tension?
- Why is surface tension important?

Skills Used

Observe, Predict, Write, Discuss, Experiment, Analyze

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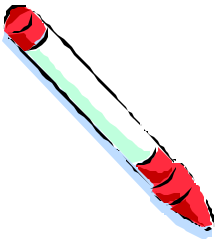
Activity

Step 1: Gather and prepare the materials needed prior to beginning this lesson. (Refer to **Teacher Fact Sheets** for background information on characteristics of water.) At the beginning of this lesson each student should have their water learning logs and a pencil, one clean penny, access to a small container of clean water and one pipette or water dropper.



Step 2: Ask students to think about what the water did when a small amount was dropped onto wax paper in "What Makes Water, Water?", if this lesson was used. If lesson 3 has not been used yet, then ask students to predict what they think might happen as a small droplet of water is placed on the penny. Encourage students to share their predictions with class members.

Tense Water Droplets, *continued*

Step 3: Instruct students to squeeze one small drop of water onto the penny. Using hand lenses, ask students to closely observe the drop of water and discuss what they see. Explain to students that the water droplets are rounded like little domes because of the bonding between the molecules of water where its surface meets the air. This is known as ***surface tension*.** Also explain that without gravity, water would form perfect spherical shaped droplets, since the sphere is the geometric shape with the smallest surface-to-volume ratio.

Step 4: Tell students that the objective of this lesson is to teach them more about water surface tension. Ask students to estimate how many small droplets of water the surface of the penny might be able to hold and write that estimation in their water learning logs.

Step 5: Explain to the students that they will be counting the number of water droplets they each place on top of their own penny. Once the surface tension of the water is broken and the water "spills" across the penny this experiment is completed and the results should be recorded in the water learning logs. Instruct students to stay focused on their penny since they each need to be responsible for counting their droplets of water as accurately as possible. Do not say anything to students at this time about how to squeeze the pipette or how to position the pipette in proximity to the penny. This should allow for a wide variety of results among the students and some lively discussions and observations. (If the pipette is held far away from the penny as the droplets of water are released, the droplets will land with more "force". This may cause the surface tension to break after only a few droplets of water have been placed on the penny. Also, results will vary depending on the pressure used by each student as the pipette is squeezed. More pressure might produce larger droplets of water.)

Step 6: Once all students have completed their experiment give students an opportunity to discuss their findings as a large group. Ask students to think about what variables could have been present during the experiment to cause the wide variety of results (dirt on surface of pennies, different sides of pennies used, pipette squeezed with different amounts of pressure, pipette held different distances from penny, shaking hands, . . .). Give students time to add discoveries to their learning logs and questions to their question strips at the conclusion of this lesson.

Extensions / Variations

1. If working with younger students, working in pairs may be easier, since one student can count as the other student squeezes the water droplets onto the penny. Once the surface tension is broken and the actual amount of drops is recorded, the students can switch roles.
2. Set up an area in the classroom with materials available for students to redo this experiment, using different variables. Encourage students to keep specific notes on how the variables were changed each time and post the results in the center for others to read.
3. If there is enough time, make a solution by adding a squirt of liquid soap to the water students are using and have students try the experiment again. (The soap makes it very difficult for the water to maintain its surface tension.)
4. Add clean water to a shallow pan. Sprinkle pepper onto the surface of the water. The surface tension remains unbroken. As students gather around to watch, squirt some liquid soap into the center of the pan. The soap breaks the surface tension as it mixes with the water, and causes the pepper to quickly "scatter".

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

H 2 O-verpowering the Opponents!

Standard

Science: SC-E-1.1.1, Students will understand that materials have many observable properties such as size, mass, shape, color, temperature, . . . and the ability to react with other substances.
Science: SC-E-2.1.1, Students will understand that earth materials include solid rocks and soils, water, and the gases of the atmosphere.

Activity Description

Students will be introduced to the concepts of cohesion, absorption and flow as they further explore water in its liquid state and participate in water races.

Materials

- Clear beakers in different sizes
- Wax paper
- Class set of pipettes or water droppers
- Shallow trays or cookie sheets
- 10 ml graduated cylinders (1 for each group)
- Water in opaque container
- Class set of plastic straws
- Water learning log and
- Toothpicks

Length of Lesson

Approximately 60 minutes

Vocabulary Words

Absorb—movement of water into another material.
Cohesion—the force by which molecules of the same kind or the same body are held together.
Flow—movement of water over another material.
Molecule—the smallest particle of a compound that can exist in the free state and still retain the characteristics of a compound.

Essential Question

What is water and why is it important?

Guiding Questions

- What is a water molecule?
- Why is cohesion important in the flow of water?
- Why is surface tension important to the flow of water?
- What role does gravity play in the flow of water?

Skills Used

Observe, Discuss, Experiment, Compare
Communicate, Write, Analyze, Reflect

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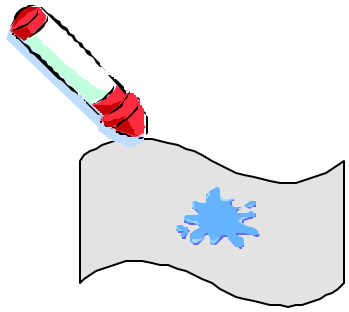


H2O-verpowering the Opponents!, *continued*

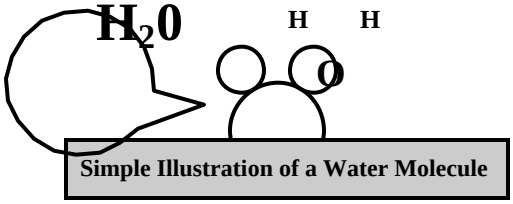
Activity

Step 1: Hold up an opaque container of water. Tell students that the container is filled with one of earth's materials — WATER! Ask students to share what they know about water, as a quick review. Write any new water facts not yet recorded onto pre-cut raindrops. Hang these raindrops on the wall with the collection that has been growing since the first lesson of this unit. (Also, remember to keep writing unanswered questions on sentence strips to add to the wall as reminders for further investigations.)

Step 2: Pour the water into a clear beaker. Ask students to describe what they observed. (The water took on the shape of the new container.)

Step 3: Once again, pour the water from the clear beaker into a totally different shaped beaker, or container. Ask students to share observations. Explain that a liquid is a substance that takes on the shape of the container into which it is stored.

Step 4: Give each student a small piece of scrap paper. Ask the students to tear the scrap paper in half over and over again until it gets too small to tear anymore. Allow time for students to get the scrap paper torn into tiny, tiny pieces. Then explain that one molecule of water is the smallest particle of water possible, even too small to be seen unless using a powerful microscope. Explain that one water molecule is made up of one atom of oxygen bonded (or stuck) to two atoms of hydrogen, gases that are found naturally in our atmosphere. (Refer to **Teacher Fact Sheets** for theories about how water came to be a part of our world.) Draw a model of a water molecule on the board for students to visually study. Tell students that they will be learning more about how water molecules cohere, or "stick together" in this lesson..



Simple Illustration of a Water Molecule

Step 5: Next, give each group of four students a 12 inch by 12 inch piece of wax paper. Ask a student from each group to cut the wax paper into fourths so each student has a piece to use. (Explain that wax paper is a good surface on which to observe water because the fibers in the wax paper are so close together that water **flows** across the paper instead of being **absorbed** into the fibers like materials such as paper towels, whose fibers have larger spaces between them.) Place small containers of water on each table, along with a pipette, or eyedropper, for each student. (It is a good idea to have extra pieces of wax paper available for students to use since the wax paper tears, or the water is absorbed once some of the wax is scraped off the paper.)

Step 6: Ask students to use the pipette to place several drops of water onto the wax paper. Encourage students to observe the water droplets closely as each student tries to maneuver the droplets around on the wax paper. Suggest that students try working with a straw, toothpick and fingers to see which works best with the water on the wax paper. Also suggest to students, if this does not happen naturally, that they try separating the larger drops into smaller droplets, then blow them back together. This introduces the concept of **cohesion**, the way molecules are drawn together, in a natural setting.

H2O-verpowering the Opponents!, *continued*

Step 7: While students are busy observing and experimenting with their water on wax paper, ask them to try to pull their drops of water across the paper. Discuss what happened. (Cohesion held the water molecules together so the water could be pulled.) Then ask them to try to push the drops of water across the paper. Discuss what happened. (Since water is a liquid, the straw, finger, or toothpick traveled through the water and was unable to push the water molecules across the paper.)

Step 8: After students have been given about 10 to 15 minutes just to experiment with and observe the water, ask students to move away from their work stations to a different area of the classroom to discuss any new discoveries about water. (Have water droplets and paper strips ready to add any new water facts or questions.)

Step 9: After students are finished talking about how their water "behaved", announce that it is time to prepare for water races! Explain that the water races will take place at each work station. Each student will be given the same amount of water to move along a new piece of 12-inch by 12-inch wax paper. Two students will race at the same time, with the two winners from each group of four students competing in the final race to determine the group winner. Let students decide on their own how they want to move their drop of water down the race track (by blowing, using a straw or toothpick, etc.). Designate the amount of water each student should place on the new piece of wax paper prior to the start of the water races. (2 or 3 ml works well, if 10 ml graduated cylinders are available to use as measuring tools.) Stand back and let the races begin!

Step 10: Monitor the small group races as preparation for the closing large group activity is taking place (shallow pan lined with wax paper is needed). Once the small group races are over, call students together for a large group demonstration.

Step 11: Ask students how the water races went. Was it easy to get the water to move across the wax paper together as one unit, or was it difficult to keep all of the water molecules moving together? Ask students for suggestions on ways to make the water races easier.

Step 12: Show students the shallow pan lined with wax paper. Prop one end of the pan on a book. Ask students what they think will happen when a drop of water is placed at the higher end of the pan. (Gravity will pull it down to the bottom.) Explain to students that they have been racing water on a flat surface, but that they will now get to experiment with it on a sloped, or inclined, surface.

Step 13: If pans are limited, explore water on a slope as a large group activity. If there are enough pans available for each group of four to six students to have one, send students back to their small groups to experiment with racing water down the slope. Have paper towels available for students to use to dry the surface after each race, if students decide to hold a second round of races. Help students arrive at a better understanding of the role gravity plays in how water flows down hillsides and into rivers.

Step 14: After about 10 to 15 minutes with the pans, give students time to reflect on and write in their water learning logs about what they learned from these water explorations, and previous ones that helped them perform well in the water races. Ask students to think about and answer this question: Is river water going to move faster on a steep slope or a gentle slope? Why? Have students record questions on question strips.

Step 15: Go outside. See how water would flow if poured on a school site.

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

Water Ups & Downs

Standard

Science: SC-E-1.1.2, Students will understand that properties (e.g., size, shape) of materials can be used to describe, separate, or sort objects.

Activity Description

Students will explore water density by using common objects to design floating and sinking experiments.

Materials

- The book **Who Sank the Boat**, by Pamela Allen, Sandcastle, 1982
- Common classroom objects. Clear containers of water
- Salt and spoons Learning logs and pencils
- Class set of worksheets found at end of activity (optional)

Length of Lesson

30 – 45 minutes

Vocabulary Words

Density—a measure of the compactness of matter; defined as the amount of matter per unit of volume. Density is sometimes thought of as the "lightness" or "heaviness" of a substance.
Solution—a mixture formed by dissolving one or more substances, whether solid, liquid, or gaseous, in another substance.

Essential Question

What is water and why is it important?

Guiding Questions

- What is density?
- Why do some objects float and other objects sink in water?
- How does salt affect the density of water?

Skills Used

Observe Compare Experiment Organize
Record Discuss Communicate Predict

****

Activity

Step 1: Read and discuss the book, **Who Sank the Boat**, by Pamela Allen, or another book that deals with floating and sinking objects.

Step 2: Prepare clear containers of water, approximately the size of a small aquarium if available, and gather common classroom objects for students to share during this experiment. Make copies of the accompanying activity sheet, if desired. (Activity Sheet 1, which is found at the end of this lesson, has been designed for use by younger students. Activity Sheet 2, which is found at the end of this lesson, has been designed for use by older students.)

Water Ups & Downs, *continued*

Step 3: Before conducting this experiment, ask students to define floating and sinking. Tell students that they will be experimenting with different objects to discover if they will float or sink in water. Instruct students to first make a prediction as to whether they think the object will float or sink.

Step 4: After completing the prediction column on their paper (or in the learning log, if you choose to record results in that fashion) give students enough time to conduct the experiment. While students are conducting the experiments, walk around the room and encourage discussion.

Step 5: Once the first part of this experiment has been completed, ask students if they can explain why some objects float while others sink. Explain that **density** refers to how tightly particles are compacted together. The tighter the particles, the heavier the substance or object and the greater the pull of gravity on the substance or object.

Step 6: Ask students if they have ever been to the ocean. Call on students to describe ocean water (salty taste). Tell students that they will be given a specific amount of salt to add to their water. **In order to compare the results from different tables, give different amounts of salt to each table, beginning with 1/2 cup of salt at the first table and increasing by 1/4 cup at each of the other tables.** Instruct students to redo the experiment a second time, remembering to mark the predictions first. Discuss the results. Did salt change the water density? How can we tell?

Step 7: Give students time to use their water learning logs to record thoughts and questions as they reflect on and write about density and why things float or sink in water. Add questions to question strips.

Extensions

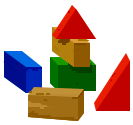
1. For students who would like to take this experiment to a higher level, give them an opportunity to make a density float. They will need a tall clear container, corn syrup, glycerin, colored water, and corn oil. Carefully pour about 3 centimeters of each substance, in the order they are listed, into the container. Once this has been done, carefully add a metal object, a solid rubber ball, a plastic object, and a piece of balsa wood. These objects should settle at different levels in the container. (Students may need to experiment with the plastic and rubber objects in order to find ones having the correct density to float at different levels..)
2. Ask students to predict the density of other liquids such as cooking oil, molasses, rubbing alcohol and milk, as compared to water. After making predictions, ask students how they might test their predictions to see if they are correct.

Side-Tracking

In a flat container, such as a pie tin, evaporate some of the leftover salt solution. Many interesting crystals will remain. Students may question why ocean water is not ridded of its salt in the same way to create drinking water. Explain that some "desalination" water plants have been built during times of water shortages due to droughts in the western United States, but it is a very expensive way to remove salt from ocean water. It is more economical to take care of the fresh water we have available as surface and ground water.

Name_____ Date_____

Water Ups & Downs

	Without Salt in Water				With Salt in Water			
	Prediction Float / Sink		Actual Answer Float / Sink		Prediction Float / Sink		Actual Answer Float / Sink	
 Paper clips								
 Pencil								
 Blocks								
 Crayons								
 Scissors								
 Paintbrush								

- **Remember to mark your prediction before you conduct the experiment.**
- **Try the experiment a second time, but add salt to your water prior to conducting the experiment. Do any of the results change? If not, keep adding more salt.**
- **Think about this experiment and write about what you observed in your learning long.**

Name_____ Date_____

Water Ups & Downs

Objects	Without Salt in Water		With Salt in Water	
	Prediction Float / Sink	Actual Answer Float / Sink	Prediction Float / Sink	Actual Answer Float / Sink
_____				
_____				
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- **Remember to mark your predictions before you conduct the experiment.**
- **Try the experiment a second time, but add salt to your water prior to conducting the experiment. Do any of the results change? If not, keep adding more salt.**
- **Think about this experiment. Write about what you observed in your learning log.**

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

What's the Matter?

Standard

Science: SC-E-1.1.3, Students will understand that materials can exist in different states and some common materials, such as water, can be changed from one state to another by heating and cooling.

Activity Description

Students will explore water as a liquid, solid and gas.

Materials

- The book **Water, My First Nature Book**, by Adrienne Sotter-Perrot, 1993 (or another suitable book)
- A clear plastic cup for each group
- Permanent markers
- Digital camera (optional)
- Computer software to create time-lapsed digital imagery (optional)
- Measuring tools (optional)

Water
Water learning log
Pencil

Length of Lesson

Approximately 20 minutes, with experiment lasting throughout the day

Vocabulary Words

Atmosphere—the body of gases surrounding Earth.
Gas—a form of matter having extreme molecular mobility and capable of diffusing and expanding rapidly in all directions.
Liquid—a free flowing substance that borrows the shape of its container.
Matter—that which makes up the substance of anything, occupies space and is perceived by the senses.
Solid —a state of matter characterized by definite shape and volume.

Essential Question

What is water and why is it important?

Guiding Questions

- Water can exist in what 3 forms of matter?
- What causes water to change its form?
- Why is it important for water to be able to change forms?

Skills Used

Analyze	Observe	Communicate	Write
Compare	Experiment	Discuss	Predict

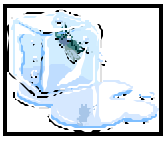
Technology, if digital photography is used

****

Activity

Step 1: Prior to beginning this lesson, gather the materials listed above. Also, check the **Teacher Fact Sheets** for background information on the characteristics of water.

NOTE: This experiment will achieve better results if it is started early in the morning.



What's the Matter?, *continued*

Step 2: Prepare the clear plastic cups for each group of students. If working with younger students, it may be easier to mark the cups with group names and the half-way mark prior to beginning the lesson. If working with older students, you may wish to have each group measure out a specific amount of water, then mark the level of the water on the side of the cup. Measuring tools will need to become a part of the materials list if students are required to measure out the specified amount in milliliters or ounces.

Step 3: Read and discuss the book, **Water, My First Nature Book**, by Adrienne Soutter-Perrot, with the students. (Any book that talks about the characteristics of water in its three states will work well as an introduction to this lesson.)

Step 4: Divide students into small groups and distribute a plastic cup and water to each group. Depending on how the lesson is organized, instruct students to add water to the cups (either up to the line that has already been marked, or a specific amount, then mark the level). Ask students to choose a place in the school to put their cups. (Some students may choose the window sill, freezer, refrigerator, closet, etc.)

Step 5: If a digital camera is available, take a picture of the cups of water immediately after they have been placed throughout the school building. Also, if possible, take pictures each time the cup of water is checked so the information can be visually viewed at a later time. ("Timeliner" software, a Tom Snyder product, or any similar product, can be used, along with HyperStudio or PowerPoint) to sequence the pictures to create a visual presentation of matter changing states.)

Step 6: After the cups are in place, give students time to record predictions in their water learning logs as to what they think will happen to their cups of water.

Extensions / Variations

1. For students who need to see faster results, use small pieces of laminated graphing paper. Place the desired amount of water directly onto the graphing paper after the laminated paper has been placed in designated locations. Determine the area of the drop of water on each piece of graphing paper by counting the square units it covers. Record the size. When each observation is made, the size of the water drop will need to be figured and recorded.
2. As a language arts assignment, encourage students to write a fictional story about the mystery of the changing water. Poetry and songs are another great avenue for students to use. Refer to Resource List at the end of this unit for suggested books. Songs about water can be found at the end of the Interme-

Step 7: Allow students time to check the amount of water in relation to the line on the cup every hour. If changes are taking place, these changes should be recorded in the learning logs. (Students should be given time and encouraged to record discoveries in their water learning logs throughout this experiment as well as add question strips to the bulletin board.)

Step 8: At the end of the day, have each group of students present their findings. Encourage students to share insights or questions they may have about the changes they witnessed. (Some of the water levels may not show much change if the cup of water was not placed in direct sunlight, close to a heat source, or in a freezer. It may take two days to get more dramatic results, so be patient!)

Step 9: Once the experiments are finalized, help students prepare visual presentations about their findings.

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

Constantly Changing Water Molecules

Standard	**Arts and Humanities: AH-E-2.1.12,** Students will create movement patterns using locomotor and non-locomotor movement. **Science: SC-E-1.1.3**, Students will understand that materials can exist in different states and some common materials, such as water, can be changed from one state to another by heating and cooling.
Activity Description	Students will explore water as a liquid, solid and gas through movement.
Materials	Script for teacher (included in lesson plan)
Length of Lesson	Approximately 15 minutes
Vocabulary Words	**Matter**, **Gas**, **Liquid**, **Solid** (Review from previous activity)
Essential Question	**What is water and why is it important?**
Guiding Questions	• What 3 forms of matter can water become? • What causes water to change its form?
Skills Used	Listen Follow Directions Interpret Create

****

Activity

NOTE: This is a simple movement activity that works well when students become restless and need to move around for just a few minutes, while reviewing previous learning.

Step 1: Review concepts of the water molecule and the three states of matter that were covered in previous lessons.

Step 2: Explain to students that water molecules react in predictable ways when they are subjected to hot or cold conditions. Tell students that this lesson requires them to pretend to be a water molecule as they change their states of matter from a **solid** to a **liquid** and then a **gas.**

Constantly Changing Water Molecules, *continued*

Step 3: Ask students to stand up and move to an open area in the classroom. (This activity can be done in a hallway or outside, also.) Instruct students to listen to the script read by the teacher so they will understand what they are supposed to do. Read: "You were poured into an ice tray and placed in the freezer earlier in the day so there would be enough ice cubes to use in drinks at dinner. You are now a frozen ice cube. Water molecules slow down as they get colder and colder, and finally quit moving when they become a solid. Squeeze tightly against your neighbor to show you are a solid." (Tell your "molecules" that you are checking to see if they are all frozen as they try to stand perfectly still.)

Step 4: Read the following script: "Oops! I took the tray of ice cubes out of the freezer and left the tray setting on the kitchen countertop. The ice cubes are beginning to melt. I see water molecules slowly moving apart and changing from a solid to a liquid." Tell students that their bodies should still be close together, but not squeezed so tightly, because the water molecules are still stuck together in the ice cube tray as a liquid. (Make a big deal about checking your "molecules" once again to see if they are warming up and melting.)

Step 5: Read the following script: "Oh, dear! The sun was shining through the window onto the ice tray! About half of the water that was in the tray has disappeared! Some of the water molecules have escaped as they changed from a liquid to a gas!" Encourage students to begin to move, or even hop, around as they separate and move into the surrounding atmosphere. (Check the "molecules" to see if they are separating and changing from a liquid to a gas.)

Step 6: Explain to students that this is a demonstration of how water molecules react to cold and heat in real life situations. Reinforce the idea that water never totally disappears (in the sense of going away never to return). Explain that as the molecules disperse into the air (evaporation), they will eventually condense, or reunite with other water molecules and change back into a liquid as they cool. Explain that water molecules are in a constant state of motion, we just usually do not pay any attention to the change taking place because it is such a normal part of daily living.

Step 7: (Optional) Conclude this activity by asking students to write about how water makes them feel in different settings: the beach, a lake, a pond, a river, a fountain, snow, rain, ...

Extensions / Variations

1. At different times throughout the school year, a variation of this activity can be used as a simple movement activity in the classroom, but also as a valuable way to review information learned about the water molecule. Change the story each time to a different setting to create different visual stimulation for the students. As students become familiar with the pattern of this activity, call on volunteers to make up the stories. This is a simple way to check for comprehension.
2. When feeling in a really crazy mood, stand the students up and just call out "liquid", "solid" or "gas". Observe the students to see how quickly they can react to the cue to turn into a water molecule.

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

Where Does All the Water Go?

Standards

Arts and Humanities: AH-E-4.1.41, Students will create artwork using the elements of art and principles of design.
Science: SC-E-1.1.3, Students will understand that materials can exist in different states and some common materials, such as water, can be changed from one state to another by heating and cooling.

Activity Description

Students will make puzzles showing the water cycle at work to share with their classmates and families.

Materials

- Art supplies
- Tag or white poster board
- Art paper (if using tag board)
- Glue (if using tag board)

Length of Lesson

Approximately 60 to 90 minutes (May be divided into two lessons)

Vocabulary Words

Accumulation—the collecting of surface water after precipitation.
Condensation—the process of changing a gas or vapor to a liquid, as in the formation of water droplets.
Evaporation—the process by which liquid water is heated to the point it changes into water vapor, a gas, and rises into the atmosphere.
Ground water—water that infiltrates (soaks into) the earth and is stored in porous spaces of soil and rock below the earth's surface, within the zone of saturation.
Hydrologic cycle—the circulation of water in and on the earth and through earth's atmosphere through evaporation, condensation, precipitation, run-off, ground water storage and seepage, and re-evaporation into the atmosphere. (Also called the **Water Cycle**.)
Infiltration—the process in which moisture soaks into the ground, where it is either taken up by plants or sinks below plant roots into the ground water.
Precipitation—water that falls to the earth as rain, sleet, snow or hail.
Runoff—water, usually from precipitation, that flows across the ground—rather than soaking into it—and eventually flows to oceans or interior basins, like lakes or ponds.
Surface water—all the water on the surface of the earth, including snow and ice.
Transpiration—the process in which plants give off moisture (water vapor) as a by-product of photosynthesis.
Water vapor—the gaseous state of water.

Essential Question

What is water and why is it important?

Guiding Questions

- What 3 forms of matter can water become and how does that relate to evaporation, condensation, and precipitation?
- How does water travel around the earth?
- Where does all of this water come from?

Skills Used

Draw Analyze Connect Explain

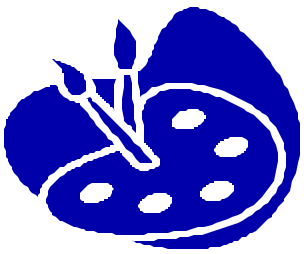
Where Does All the Water Go?, *continued*

Activity

Step 1: Review the three forms of water (liquid, solid and gas). Ask students to think about and discuss how they think water moves from one point to the next. Emphasize during this discussion the idea that water evaporating from a puddle or pond close to the school does not hang in the air around school. Instead it rises into the air and is blown around in the earth's atmosphere by wind. Explain that we reuse the water found on Earth over and over again, but that this water travels all around the earth. (A weather satellite picture from the Internet that shows cloud movement might help illustrate this concept better than verbal explanations. See: www.weather.com.)

Step 2: Ask students what types of precipitation fall to Earth (rain, sleet, snow and hail) and list these on chart paper or the board. Discuss and list the form water takes once it falls back to Earth and becomes ground water and surface water (lakes, streams, ponds, puddles, glaciers, rivers, oceans, etc.).

Step 3: Tell students that they will be creating a picture of the water cycle, but they must choose one water source (surface water) and a form of precipitation (e.g., rain and a pond or snow and a glacier) to show in their art work. Give students a variety of art materials to use (crayons, colored pencils, pastels, watercolors), but remind them that the picture must include evidence of **evaporation, condensation, precipitation** or **accumulation** taking place. (Post these words and review to make sure students understand their meaning before the students begin working on their pictures.)



Step 4: Once students think their pictures have been completed, have them team up with a classmate and explain how the water cycle works in their illustration. (This will give students the opportunity to review the water cycle concept as they check to make sure they have included everything they need in their art work.)

Step 5: Next, have students cut apart their pictures and store the pieces in envelopes. (It will help to remind students to cut the pictures into large, puzzle-shaped, pieces, instead of small slices. Demonstrate this step for younger students.) Also, ask each student to count the number of puzzle pieces their envelope contains, and write that number on the outside of the envelope, so the student using the puzzle can make sure all of the pieces are returned to the envelope. Students should also write their names on their envelope.

Step 6: Once several students have completed their puzzles, have students work in pairs to exchange their envelopes and put together the puzzles created by other students. Remind each student to look for the way their classmates chose to show the water cycle once the puzzle has been reassembled.

Step 7: Allow time, as students are completing puzzles, to review the information that has been written on raindrops posted around the classroom. If students have any more information to include on the raindrops, add this to the information already posted. Also, give students time to reflect in their learning logs at the conclusion of this lesson.

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

A Journey Through the Water Cycle

Standard

Science: SC-E-1.1.3, Students will understand that materials can exist in different states and some common materials, such as water, can be changed from one state to another by heating and cooling.

Activity Description

Students will journey through the water cycle as clouds in this interactive lesson.

Materials

- Posters created in "Water Walk" activity
- Bowls of water at each station
- Class set of cloud-shaped sponges
- Continent name tags (optional)

Pencil
Water learning log

Length of Lesson

Approximately 45 minutes

Vocabulary Words

Review vocabulary introduced in previous lesson.

Essential Question

What is water and why is it important?

Guiding Questions

- What 3 forms of matter can water become and how does that relate to evaporation, condensation, precipitation, accumulation and transpiration?
- How does water travel around the earth?

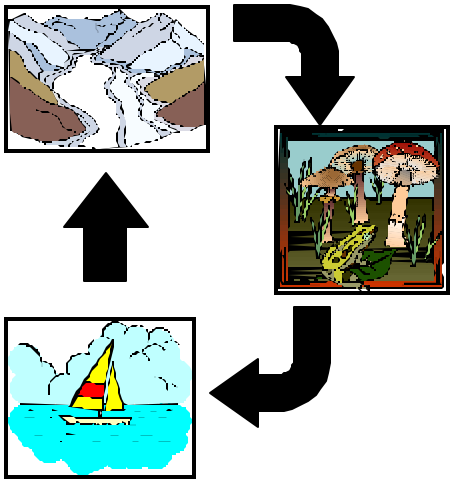
Skills Used

Interact Follow directions Recall Connect

****

Activity

Step 1: Review information about the water cycle that has been previously covered in class. Take out cold, metal spoons and blow on them. Ask students to explain how this relates to what they drew in the previous lesson "Where Does All the Water Go?" **(condensation)** Have students lick a finger then wave it in the air. When the saliva "disappears" ask students to relate this to what happens during the water cycle. **(evaporation)** Using a hot plate as a heat source, boil water in a glass pan, if available. Place ice in a glass bowl. Hold the bowl over the boiling water so it "catches" the escaping water vapor that is evaporating from the boiling water. As the water condenses on the sides of the cold bowl, the students will see precipitation begin to fall in the form of droplets of water cascading back down to the pot. Ask students how this relates to the water cycle. **(precipitation)**



A Journey Through the Water Cycle, *continued*

Step 2: Remind students of "Water Walk" when they made the posters showing where water can be found. Tell students that they will be using those posters in this lesson as they pretend to be clouds, traveling all around the world, collecting evaporating water. Use the overhead projector or board to show a list of the different scenes shown on the posters from "Water Walk". Give each student a card, or recycled paper, to write ten water sources they would like to visit as they gather their water. While students are deciding which locations to visit, begin placing the posters around the classroom. Beside each poster, place a bowl of water and a plastic spoon.

Step 3: Once the posters, water and spoons have been placed around the classroom, give each student a sponge cut in the shape of a cloud. Explain that as clouds, they must collect the "evaporating water" from each water source they visit around the room by adding one spoon of water to their sponge at each station.

NOTE: To make this lesson more geography-based, the posters showing the water sources may be organized on different "continents" around the classroom. This will reinforce the idea that evaporated water collects and travels all around the world, rather than making a circular motion over one area, as most water cycle diagrams show.

Step 4: Once the posters and bowls of water have been placed around the classroom, instruct students to begin visiting the water sources they have written on their cards. Remind students to take one spoon of water at each station and carefully pour it onto their sponge. Explain that they are simulating what happens as water condenses (changes from a gas to a liquid) and becomes clouds. Tell students that as the sponge becomes saturated with the condensed water, and starts dripping, each student should decide on which continent or water source they would like to "precipitate". (Students will squeeze water back into one of the bowls to make precipitation.)

Step 5: Continue this water cycle simulation activity until all students make it through their ten pre-selected water stations. Stress the point that when water vaporizes, it cannot be seen, but the molecules of water are suspended in the air around us as they make their journey through the water cycle. Also, reinforce the idea that it takes heat for evaporation to occur and cool air high in the atmosphere for condensation and precipitation to occur.

Step 6: As a conclusion for this lesson, ask students to reflect on the experience in their learning logs and write about any new insights they may now have about the water cycle and how it works. Make sure they add any questions to question strips.

Assessment

Give students the following writing prompt as an assessment on what they have learned. "You have just washed your hands before going to lunch. Thinking about what you have learned about the water cycle, what are at least three different ways you can think of to dry your hands? In your answer, explain what happens to the water that was on your hands."

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

To See is to Believe!

Adapted from "What Goes 'Round Comes "Round" found in *Splash Water Resource Education*, Southwest FL Water Management District

Standards

Science: SC-E-1.1.3, Students will understand that materials can exist in different states and some common materials, such as water, can be changed from one state to another by heating and cooling.
Science: SC-E-3.1.2, Students will understand that organisms have basic needs (e.g., air, water, nutrients, light) and can only survive when these needs are met.

Activity Description

Students will make a mini-model of the water cycle using 2-liter soda bottles in order to observe evaporation, transpiration, condensation, precipitation and infiltration taking place.

Materials

Supplies needed for one model:

- Three 2-liter plastic soda bottle
- Three plastic bottle caps
- Two feet of heavy cotton string (wick)
- Scissors, hammer, nail, sharp knife
- Digital Camera (optional)
- Plant seeds (Chinese cabbage, radish, etc.), or small plants
- Hair dryer
- Soil
- Tape
- Water and ice
- Learning logs and pencil

Length of Lesson

Approximately 30 minutes to discuss, put models together, and begin demonstration (Observations take place throughout the day.)

Vocabulary Words

Review terms learned in previous lessons about the hydrologic cycle.

Essential Question

What is water and why is it important?

Guiding Questions

- What are signs of the hydrologic cycle in the real world?
- How does the model show what happens in the hydrologic cycle?

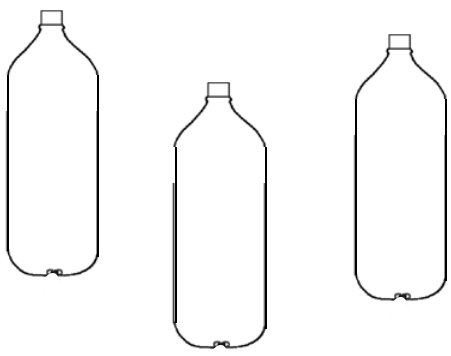
Skills Used

Observe, Experiment, Analyze, Construct
Communicate, Record, Discuss, Compare
Technology (if using digital camera)

****

Activity

Step 1: Prior to beginning this lesson with students, collect and prepare the plastic 2-liter bottles. (See next page for specific directions on how to prepare the bottles.) If plans are to only do one classroom demonstration model, only three 2-liter bottles will be needed. If plans are to have each student make a personal model to take home, then multiply the basic materials listed above by the number of students.



To See is to Believe!, *continued*

Step 2: Use a hair dryer on the lowest heat setting to soften the glue on the soda bottle labels so that they may be removed. Mark the bottles A, B, and C to tell them apart. Cut each bottle as shown in ***Diagram A*** on the next page.

Step 3: Poke a hole in the bottle cap on Bottle B. Insert a string/wick loop so that about 3 inches hang down from the cap. Place the cap with no hole on Bottle C. Tie the remaining 7 inches of string around the neck of Bottle C, so that it hangs down about 3 inches. (See ***Diagram A*** for illustration.)

Step 4: Assemble the bottles as in ***Diagram B:*** Bottle C fits into Bottle B, and Bottle B fits into Bottle A. Thoroughly wet both wicks. This will bring a constant source of water from a reservoir to the plant roots. Add about one pint (16 ounces) of water to Bottle A. This reservoir supplies water to the model's cycle. Fill Bottle B with enough pre-moistened soil to cover the top of the string loop. The string should not be pressed against the side of the bottle.

Step 5: Plant two or three seeds of a fast-growing plant, such as Chinese cabbage, carrot or radish inside the well of Bottle B. (Remove Bottle C from the other bottles when not performing a demonstration, so the air circulates, and the seeds can sprout and grow.) **NOTE: You may opt to place small green plants in this soil instead of planting seeds, if you like.**

Step 6: Place a plastic bottle cap on top of the soil in center of Bottle B, so that the wick from Bottle C drops into it. The bottle cap represents a water body and will collect water when the model "rains". **NOTE: Taking digital pictures of this demonstration will allow students to observe the process over and over again. See "What's the Matter" for previously mentioned suggestions.**

Extensions

1. Before demonstrating the hydrologic cycle the second time, or in the future, add a drop of food coloring inside the bottle cap. Place the bottle cap on the soil so it can catch the "precipitation", once the ice is added to the top bottle. When the rain fills the cap, the food coloring will have tainted the water. Explain that this is how pollution can contaminate water bodies.
2. (Visit http://brainpop.com/science/earth/water/index.wem/ to view a short movie about the water cycle and play water trivia games.)
3. Use the classroom hydrologic cycle model to demonstrate the needs of plants. Insert bottle C, or place plastic wrap on top to create a terrarium, which is an example of a closed system, similar to the system we operate within on Earth.

Step 7: Fill Bottle C with ice water. Tape the seams between bottles to seal them (***Diagram C)***. Observe the bottle cap after a few hours. The model's condensation should have filled the cap with water.

Step 8: Encourage students to discuss what they observe taking place inside their models. Also, instruct students to write the time each observation takes place and briefly describe in their learning logs what changes they see inside their models.

Step 9: After making observations, bring the students back together and ask questions (like the "Guided Questions" listed at the beginning of this lesson). Encourage students to explain, using terminology learned during the previous lessons, as well as their own words and pictures, how the water cycle works. Share this demonstration with other students, or parents, by using the models or showing the digital photographs. Continue to write questions on question strips.

To See is to Believe!, *continued*

Hydrologic Cycle Model

Written directions for assembling these models are found on the previous page. This completed model can also be used to demonstrate pollutants. (See **Extensions** , on the previous page.)

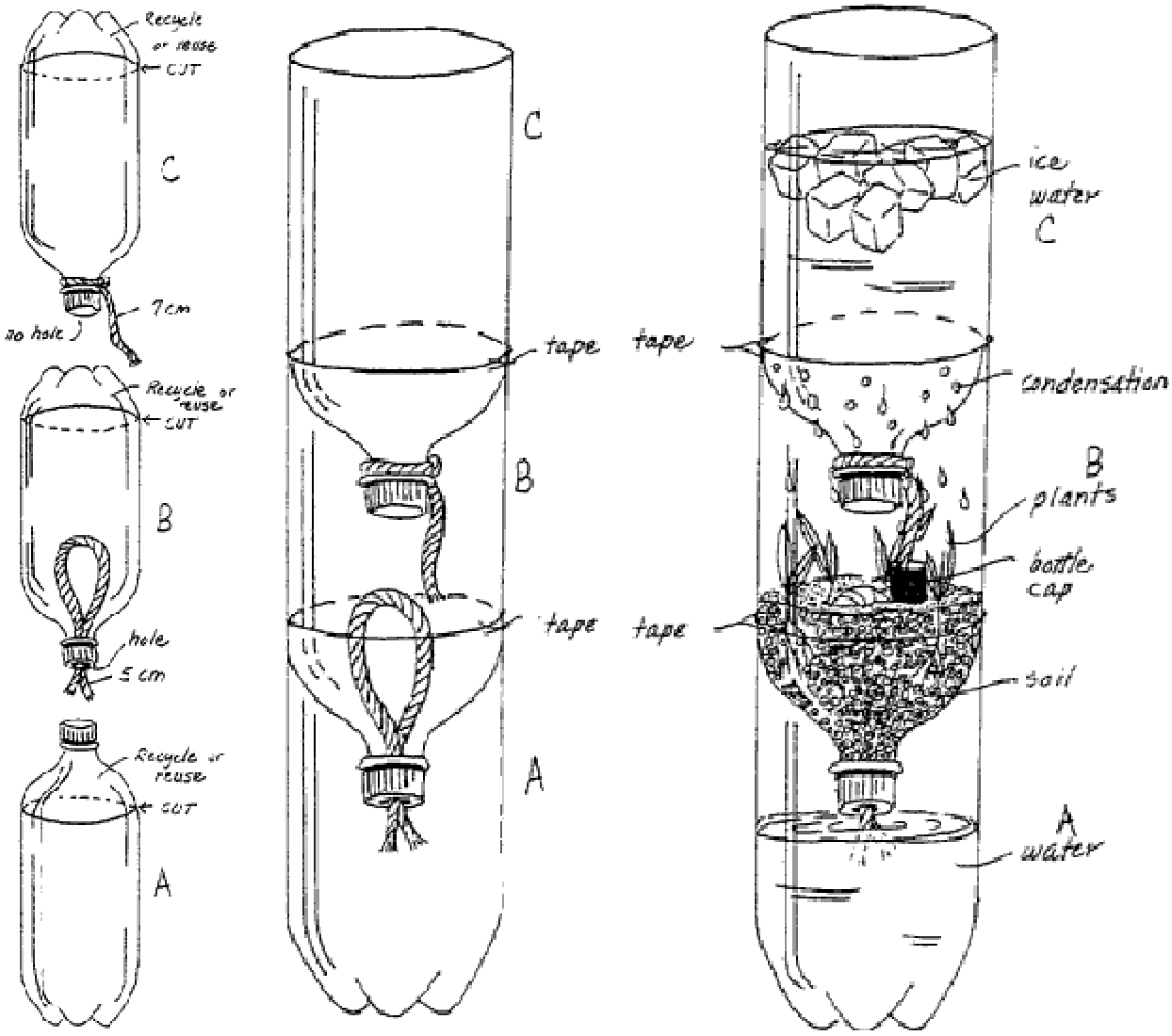


Diagram A **Diagram B** **Diagram C**

Diagrams downloaded from the following web site: **http://www.swfwmd.state.fl.us/infoed/educators/splash/hydcycwk.htm.**

Kentucky's Commonnwealth of Water – Be a Water Explorer
Primary

Survival Needs

Standards

Science: SC-E-3.1.2, Students will understand that organisms have basic needs e.g. (air, water, nutrients, light) and can only survive when these needs are met.
Reading: RD-E-4.0.6, Students will read a variety of materials to accomplish authentic purposes including reading for enjoyment, to locate information, and to complete tasks.

Activity Description

Through observation, discussion and research, students will report on the needs of plants and animals.

Materials

- Digital Camera (optional)
- Computers (optional)
- Collection of nonfiction books about plants and animals
- Learning logs and pencil

Length of Lesson

Approximately 30 minutes for outside visit, with research and writing taking place during several language arts periods

Essential Question

What is water and why is it important?

Guiding Questions

What do plants and animals need in order to survive?

Skills Used

Observe Read Discuss Write
Research Communicate Analyze Draw
Technology (if using digital camera or computers)

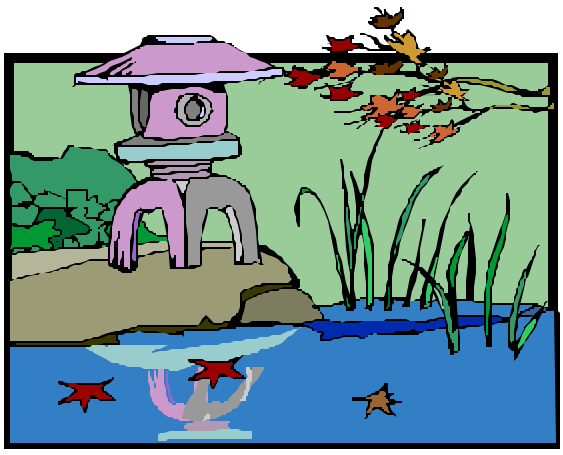
****

Activity

This activity looks at plants and animals in their native habitats. It is designed to show students the interdependence of water and all living things, while giving students a short break from working exclusively with water.

Step 1: Actively engage students in learning more about the importance of water in the lives of plants and animals by visiting a local body of water.

NOTE: If this is not possible, check your school library for a good video dealing with the needs of plants and animals, that shows living things in their natural habitats.



Survival Needs, *continued*

Step 2: Prior to taking the students outside, explain to students that they will be making a list of the plants and animals they see around the water. Tell students that they may do drawings, take digital pictures, or use words to record their ideas. Remind students to be animal trackers and search for animal tracks while outside, also. (You may wish to visit "**http://www.beartracker.com/guide.html**" to download an animal tracker's guide for students to take along on the outside adventure.)

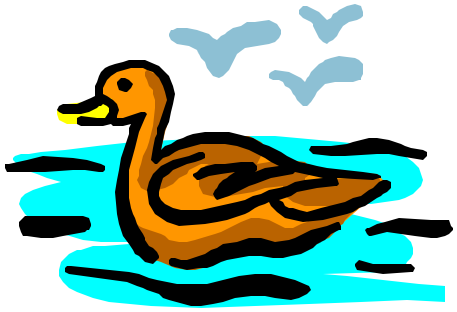
Step 3: Upon returning to the classroom, form expert groups to study the plants and animals observed. Students in each group will choose one animal or plant and create an idea web of the things it needs to survive.

Step 4: After completing **Step 3**, come back together as a group and compare the class webs. (**Kidspirations** and **Inspirations** are great software programs to help students organize thinking in a flowchart, or web, format see: www.piecesoflearning.com/publish/resource/write/ins002.htm/.) Have students reflect in their water learning logs on the importance of water to all living things.

Step 5: Prepare a collection of nonfiction literature for students to use for further investigations, transactive writings, presentations, or reading enjoyment. A trip to the Kentucky Technology Learning Network (KTLN) will allow students to share their findings with a wider audience through multimedia presentations (e.g. PowerPoint, Claymation, Hyperstudio, . . .).

Extensions

1. Invite a speaker from the local Conservation District or Cooperative Extension Service to speak to students about the needs of native Kentucky plants and animals found in the area.
2. Create a mural depicting Kentucky plants and animals in natural habitats.
3. Discuss food chains and the consequences if any part of the chain is disturbed (e.g. drought causes plants in a region to die).
4. Create an outdoor wetland area or small water pond, if there is not a close water source to school, in order to bring plants and animals closer to the school environment. The Daniel Boone National Forest has an excellent publication on vernal ponds. Call 606 784-6428 for more information.



Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

A Fishy Tale

Adapted from "Freddy the Fish", found in *Instructional Models For Use With Enviroscapes*, KEEC, NKEEA, pages 1-3

Standards

Science: SC-E-3.1.2, Students will understand that organisms have basic needs (e.g., air, water, nutrients, light) and can only survive when these needs are met.
Science: SC-E-3.3.3, Students will understand that all organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to other organisms, other changes are beneficial.

The next standard is introduced in this activity.
Social Studies: SS-E-4.4.2, Students will recognize that people depend on, adapt to, or modify the environment to meet basic needs.

Activity Description

Students will be introduced to point and nonpoint sources of pollution as they take a trip with a pretend fish in a pretend river during this simulation activity.

Materials

- Large fishbowl or aquarium
- Sponge cut in shape of fish
- Plant food /colored drink mix
- Punched out paper dots
- Yellow and red food coloring
- Grass clippings or decaying plants
- 7 small paper cups
- String
- Pencil or stick
- Liquid detergent
- A weight or fishing sinker
- Soil
- Water
- Salt
- Cooking oil

Length of Lesson

Approximately 30 minutes

Vocabulary Words

Point Source Pollution— pollution that can be traced to a single point source such as a pipe or culvert (e.g., industrial or wastewater treatment plant)
Nonpoint Source Pollution—pollution that cannot be traced to a single point (e.g., outlet or pipe) because it comes from many individual sources or a widespread area (typically urban, rural and agricultural runoff).
Nutrients—food for living organisms. If more nutrients are applied to the land than the plants growing there can use, the excess can pollute water.

Essential Question

What is water and why is it important?

Guiding Questions

- What happened in this activity to change the fish's environment?
- In our community what might pollute water?
- What can we do to clean up the water before disposing of it?

Skills Used

Observe, Predict, Communicate, Listen
Analyze, Problem Solve, Connect, Discuss

A Fishy Tale, *continued*

Activity

Step 1: Gather the materials needed for this activity. Cut the sponge into the shape of a fish. Attach the weight to the bottom of the "fish" with the string. Suspend the fish in the fishbowl or aquarium by tying it to a pencil or stick suspended across the top of the container.

Step 2: Prepare "pollutants" for this activity by placing a small amount of soil in cup #1, colored drink mix or plant food for plant fertilizer in cup #2, grass clippings or decaying plants in cup #3, cooking oil in cup #4, salt in cup #5, paper dots in cup #6, and warm water with detergent in cup #7.

Step 3: Make a copy of the script (found on the next page) on tag board. Cut it apart for students to use during this activity.

Step 4: Assign ten students to read the script. As each scene is read, ask different students to pour the mentioned pollutant into "Buddy's river".

Step 5: Take the time during this activity to stop after each substance has been added to the river and discuss how Buddy feels. Encourage discussion about water pollution and its affect on plants and animals. Discuss with students possible point and nonpoint sources of pollution in your own area.

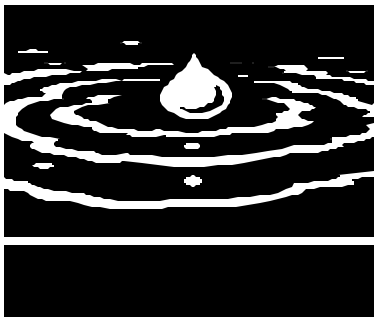
Step 6: At the end of the script, ask students what should be done with the container of polluted water. Help students gain in their understanding of why the water cannot be poured down the drain or dumped outside on the ground, since it could pollute fish or animals in local creeks or rivers.

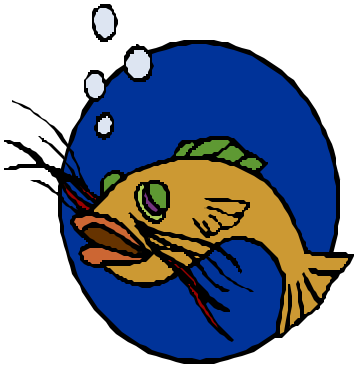
Step 7: Talk about how water is filtered both naturally and in water treatment facilities**.** Ask students to think about and discuss different types of filters they have seen used before.

NOTE: This discussion should automatically flow into the next activity in this unit, "Filtering Away Pollutants", so students can see that there are good solutions to water pollution..

Extension:

Borrow an Enviroscape tabletop model to show exactly how pollutants get into the water system. See Teacher Fact Sheets for where to borrow an enviroscape model near you.





Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

A Fishy Tale Script

1. Today we are going to imagine this container of water is a clean river flowing gently through the rolling hills of Kentucky. In this river lives a friendly little fish named Buddy. How do you think Buddy feels today as he is relaxing in his clean, beautiful river?

2. Buddy has lived in this part of the river with his family for his entire life. Today, though, he has decided that he is old enough for an adventure away from his mom and dad. Let's join Buddy as he begins his adventure.

3. Buddy's first part of his journey takes him into farm country. As he swims along, he passes a recently plowed riverbank. It begins to rain, and some of the soil from the riverbank erodes and washes into the river. ***(Pour soil into water.)*** How does Buddy feel?

4. Buddy swims close to a suburban neighborhood. Some fertilizer from the nearby lawns washed into the river a few months ago. ***(Pour plant food or colored drink mix into water.)*** This fertilizer made the plants in the river grow very dense. The river was unable to furnish these plants with all of the nutrients they needed, so they began to die and decay. ***(Pour grass clippings or decaying plants into water.)*** This decomposing process is using up some of Buddy's oxygen. How does Buddy feel?

5. Buddy swims under a bridge. Some cars traveling across the bridge are leaking oil. The rain is washing the oil into Buddy's river. ***(Pour cooking oil into the water.)*** How does Buddy feel?

6. Last week when the weather turned very cold one night, the highway department had to spread salt on the bridge to keep it from freezing. The rain is now washing the rest of the salt off the bridge and into the river. ***(Pour salt into the water.)*** How does Buddy feel?

7. Buddy is now swimming past a city park. A few of the picnickers did not throw their trash into the cans. Instead, the wind has started blowing it into the river. ***(Sprinkle in paper dots.)*** How does Buddy feel?

8. Buddy is leaving the city and swimming toward some factories located in the county industrial park. Laws have been passed to keep factories from dumping pollutants into the river, but these factories are ignoring the laws. ***(Pour warm soapy water into the water.)*** How does Buddy feel?

9. Buddy is passing the city's wastewater treatment plant and has discovered that some of the sewage from the plant is flowing into the river because the plant is not working properly. ***(Squirt 2 drops of yellow food coloring into water.)*** How does Buddy feel?

10. Finally, Buddy swims past a hazardous waste dump only to find the rusty barrels holding the harmful chemicals are leaking. The rain is washing these poisonous chemicals into the river. ***(Squirt one drop of red food coloring into water.)*** How does Buddy feel?

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

Filtering Away Pollutants

Standards

Science: SC-E-3.3.3, Students will understand that all organisms, including humans, cause changes in the environment where they live. Some of these changes are detrimental to the organism or to other organisms, other changes are beneficial.
Social Studies: SS-E-4.4.2, Students will recognize that people depend on, adapt to, or modify the environment to meet basic needs.
Practical Living: PL-E-3.3.2, To protect all citizens, there are community guidelines (e.g., school inspections, trash collection, water treatment, waste treatment, animal control, immunization) that promote healthy living environments in the community.

Activity Description

Students will discover ways to filter "polluted" water, then learn about natural filters in the environment, and wastewater treatment plants.

Materials

- Dirty water from "A Fishy Tale"
- Measuring cup
- Clear jars for each group
- Learning logs and pencils
- Cotton balls, paper towels, coffee filters, charcoal, cotton batting
- ***The Magic School Bus at the Waterworks***, by JoAnna Cole

Length of Lesson

Approximately 60 minutes

Vocabulary Words

- **Purify**—to clean.
- **Wastewater treatment plant**—a large facility that treat wastewater from homes and industry to a point that it can be safely discharged into the environment.

Essential Question

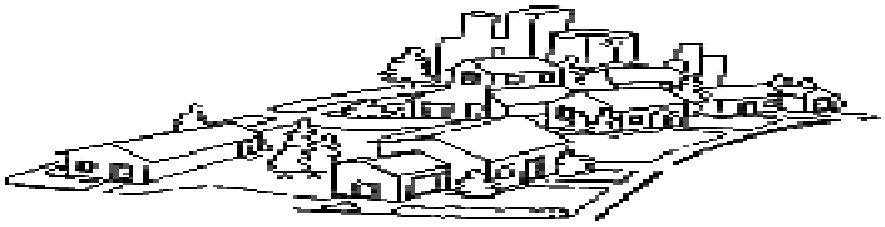
What is water and why is it important?

Guiding Questions

- Where do we get the water we use for personal consumption?
- How can dirty water be cleaned?
- How do we know water in our community is purified and safe to drink?

Skills Used

Compare	Experiment	Analyze	Investigate
Write	Discuss	Teamwork	Communicate



Filtering Away Pollutants, *continued*

Activity

Step 1: Even though this lesson can be taught separately, it is recommended that it follow "A Fishy Tale", since the dirty water left over from that lesson would lead into our study of water treatment facilities.

Step 2: Using the dirty water left in the fish bowl at the conclusion of "A Fishy Tale", ask students to think about ways they might be able to clean the dirty water in order to make it safe to throw away. (If that lesson has been skipped, begin this lesson with a gallon jug of dirty water.) List different suggestions made by students. If students have a difficult time thinking of ways to filter the water, ask them to think about filters that are used to clean water in fish tanks or pools. What materials are needed in order to filter the dirt from these water sources?

Step 3: Gather materials students think might be useful to clean Buddy's water. Divide students into small working groups. Give each group one cup of dirty water to try to clean and one small cup for each filter. Instruct students to select one person in each group to keep a written record of the materials and process they use to clean their cup of water. (This will be helpful when the group reports to the class the results of their experiment at the end of the lesson.)

Step 4: Explain how to conduct experiments more precisely by doing such things as:

- Stirring the dirty water each time to make sure each sample has similar dissolved solids.
- Use the same amount of water to pour through each filter.
- Allow the same amount of time for each filter to work.

Step 5: Allow sufficient time for each group to try to clean their water. Then ask each group to share their process and results with the rest of the class. This can be done in a large group setting at the front of the room, or by taking a mini field trip to

Step 6: After sharing test results, ask students if the water now looks clean enough to drink. If some answer "yes", ask if it is safe to drink. Emphasize to students that even when water looks clean, it may not necessarily be safe to drink.

Step 7: Read ***The Magic School Bus at the Water Works,*** by Joanna Cole, to give students a general idea of how water is treated to make it safe for human consumption.

Day 2

Step 1: If possible, take students to an outdoor stream to observe how nature filters water in a natural setting. Point out how the rocks are used to trap dirt and trash found in the water, as gravity pulls the water in the smaller stream toward the next larger water source. If there has been a recent rain, explain that the water runoff from the hillside has caused the water to be muddy. If the sediment has fallen to the bottom of the stream and the water is fairly clean, use a clear container to take a sample of the water from the stream. Hold up the container of water and ask students if the water looks clean enough to drink, and if it is safe to drink. Stress to students that water should never be taken directly from an outdoor stream or water hose to drink because of the unseen impurities in it.

Step 2: Upon returning to classroom, give students time to compare how nature cleans water with how people clean water in their learning logs.

Extensions / Variations

Students who might benefit from seeing a visual representation of a water treatment facility could visit the following web site sponsored by the Environmental Protection Agency: http://www.epa.gov/safewater/kids/treat.html

Protecting Kentucky's Water – Be a Water Explorer
Primary

The Water Patrol

Standards

Math: MA-E-3.2.1, Students will pose questions, collect, organize, and display data.
Social Studies: SS-E-4.1.1, Students will use tools (e.g., maps, globes, charts, graphs, compasses) to understand surroundings.

Activity Description

Students will mark the places where water is used on a school map, discuss the different uses of water in the building, estimate the amount of water used daily to flush toilets in one student restroom, collect data for a predetermined amount of time and analyze that data.

Materials

- Diagram of school layout (or students may draw a school map
- Timer
- 2 copies of data collection sheet (found at end of lesson)

Length of Lesson

30-45 minutes on first and third day
Students should be scheduled to collect data throughout the second day

Vocabulary Word

Conservation—the protection or wise use of natural resources that ensures their continuing availability to future generations.

Essential Question

What is water and why is it important?

Guiding Questions

- How much water do you think is used at school during a typical day?
- Why is water conservation important?

Skills Used

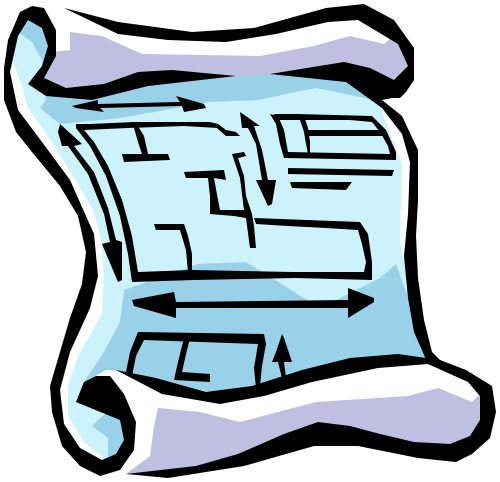
Record	Analyze	Compute	Graph
Discuss	Display	Organize	Technology

****

Activity

Step 1: This lesson may be presented in different ways, depending on the needs of your students. If working with younger students, obtain a map of the building, like the one used to mark fire escape exits. Create a transparency to use on the overhead projector. Explain the map to the students. Ask students to think about and help locate places throughout the school building where water is used. Mark those places on the map with water droplets, and keep of list of how water is used..

If teaching map skills to older students, assign different areas of the school building to different groups of students. Ask students to study their assigned section of the building, draw a map of that section, and mark the places where water is used.



The Water Patrol, *continued*

Step 2: Ask students to estimate how much water might be used to flush toilets in one student restroom for one day. Ask for suggestions on how the class might find out how much water is used. Share with students that it takes approximately 5 gallons of water when one toilet is flushed. Explain that they will be collecting information on how much water is used in the restroom closest to their classroom. Tell students they will begin collecting data on the next school day.

Step 3: Prior to the start of the next school day, prepare a schedule for students to follow that will allow two students to sit outside a student restroom in 15 minute intervals to count the number of toilet flushes. The schedule should cover the start of the school day, and end approximately 15 minutes before school is dismissed. **(Use teacher discretion about whether "breaks" are needed from this or if an attempt will be made to record data without interruptions for an entire day.)**

Step 4: Place two chairs outside the closest student restroom. To make it look more official, post a sign above the chairs stating ***"Water Patrol at Work — Please Do Not Disturb".*** Also, post a schedule in the classroom showing when students are assigned to go to the restroom to record the number of times each toilet in the designated student restroom is flushed.

Day 2

Step 1: Explain that each pair of students will take a clipboard, data collection sheet (found on the next page) and pencils with them to use as they record the data outside the restroom. Tell students that it is very important to make the information as accurate as possible by making sure they place a tally mark inside one box each time they hear a toilet flush.

Step 2: Designate responsible students to keep the timer set, mark the data collection sheets with the time each pair of new students leave the classroom (if information will be graphed based on the time and number of flushes) and catch the students up on classroom work as they reenter the classroom. This should keep the number of times instruction is disturbed throughout the day to a minimum.

Step 3: Begin collecting the data.

Day 3

Step 1: Model the use of a spreadsheet or calculator to compute the water used during the previous school day in the designated student restroom.

Step 2: Take this total and multiply it by the total number of student restrooms in the school to find an estimated amount of water used to flush toilets in all of these restrooms. Try to help students understand that this is only the flushes. Water was also being used to wash hands, drink, cook and clean throughout the day. WOW! What a lot of water to try to patrol!

Step 3: Remind students of the first lesson on the small amount of usable water on Earth. Ask if they are beginning to better understand why it is important to conserve the amount of water used.

Step 4: Use water learning logs to reflect on this experience.

Extensions

1. E-mail the office manager to find out who to contact to check on how many gallons of water were used at school during the previous month.
2. Graph toilet flushes and the time increments the data was collected to determine the time of day the most water was used.

The Water Patrol

Number of Toilet Flushes

Time of Data Collection	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

Concerned About Conserving Water

Standards

Math: MA-E-3.2.1, Students will pose questions, collect, organize, and display data.
Practical Living: PL-E-3.1.5, Students will understand that there are consumer decisions (e.g. reducing, recycling, and reusing) that have positive impacts on the environment.

Activity Description

Students will develop a survey to use to collect and analyze information about how much water their families use during a typical day at home.

Materials

- Computer (to create survey, unless using the included survey)
- Computers and graphing program (optional)
- Class set of survey forms

Length of Lesson

Approximately 60 minutes on at least two days, plus homework

Vocabulary Words

Consumption—the amount of any product or resource used in a given time by a given number of consumers.

Essential Question

What is water and why is it important?

Guiding Questions

- How much water do you think is used at home during a typical day?
- How can we find out this information?
- What can you and your family do to conserve water?

Skills Used

Analyze	Collect	Compute	Describe
Estimate	Identify	Observe	Graph
Compare	Discuss	Technology	Communicate

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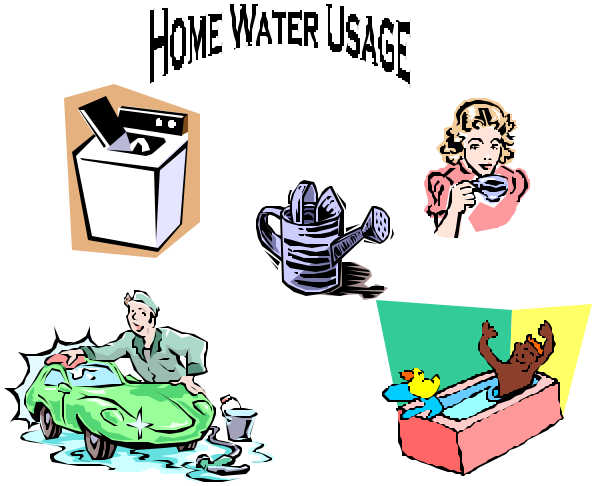
Activity

Step 1: Explain to students that, as a group, they will be compiling a survey to take home and use to find an estimate of how much water is used by their families in one day. Ask students to brainstorm how water is used in their homes. Make a list on chart paper or the board.

Step 3: Once the list has been compiled, show students how to set up a chart to collect their data. (If working with younger students, or if there is a time constraint, this step may be skipped and the chart at the end of this lesson may be used.)



Concerned About Conserving Water, *continued*

Step 3: Once the chart is ready to send home, explain it to the students, if they were not a part of the development process. Be sure to point out the "conservative" ways listed to use water on the chart. Be ready to give out question strips.

Step 4: Ask students to estimate how many gallons of water they think their family uses in one day. Ask students to write their estimate in the water learning logs, so it can be compared to the actual amount when the homework is returned to school. Send the chart home with students. Explain to students that the chart needs to be completed with the help of family members and returned to school the next day. Send survey home. You may want to assign this on Friday to give students time to investigate.

Day 2

Step 1: Bring students together the next school day to discuss the results of their home investigations dealing with water usage. Compare the estimate written in the learning logs on the previous day with the actual amount of water used. Ask students if any family members tried to change the way they normally use water at home to the conservation ideas listed on the chart. If so, applaud the efforts made to save water usage!

For parents who have Internet access, encourage them to visit ***http://www.h2ouse.org/*** to discover ways to conserve water at home.

Step 2: If the students have access to a computer lab, set up a time to allow students to enter their collected data on *Excel* or another graphing program in order to visually compare the amounts of water used for different activities at home. If a computer lab is unavailable, but each classroom has computers, try teaming primary students with older students in other classrooms in the school to individually help them enter the data and create graphs.

Step 3: As the graphs are printed, compare water usage and create a display to share with the rest of the school. Challenge students to work with families to decrease the amount of water used at home by using the conservative methods mentioned on the chart.

Step 4: Give students time to reflect, either by themselves in their learning logs, or in a group, about this activity. Encourage them to think about how they have used water in the past, and changes they will try to make in the future to conserve water. Spend some time recording student questions on question strips.

Extensions / Variations

1. Using the same basic format, this lesson can take on a different twist by sending the first collection data sheet home with the "conservative water usage" column removed. Tally and graph the results. One week later, send the data sheet home with the conservative usage included. Send a note encouraging families to use the conservative method, if possible, the second time. Tally, graph and compare the results with the previous homework.
2. Create posters to display at school, or in the community, showing how much water can be saved if people make the choice to conserve water when doing daily home activities.
3. Create infomercials for the school news program or a local television station showing ways water can be conserved.
4. Use a calculator to total the amount of water used by all students' families for one day. Multiply by 365 to obtain a yearly estimate.

Water Used at Home

Name_____ **Date**_____

Directions: Work at home, with family members to complete this chart, based on water used during one typical day. Please return this completed chart to school tomorrow. Thank you!

ACTIVITY	**Total Number of Times**	**Estimated Gallons of Water Used With Normal Usage**	**Estimated Gallons of Water Used With Conservative Usage**	**Total Gallons of Water Used**
Brush teeth		Water running 2 gallons	Water turned off 1/4 gallon	
Take a bath		Full tub 40 gallons	Low water 10 gallons	
Take shower		Standard shower head 50 gallons	Low flow shower head 25 gallons	
Shave		Water running 15 gallons	Plug & fill basin 1 gallon	
Flush toilet		Standard flow toilet 5 gallons	Low flow toilet 1 1/2 gallons	
Get a drink		Run water to cool 1 gallon	Keep water in fridge 1/16 gallon	
Wash hands or face		Water running 2 gallons	Plug and fill basin 1 gallon	
Cook a meal		Water running to wash vegetables: 3 gallons	Wash vegetables in bowl: 1 gallon	
Wash dishes by hand		Water running 30 gallons	Wash & rinse in sink: 5 gallons	
Run a dishwasher		Full cycle 16 gallons	Short cycle 7 gallons	
Do a load of laundry		full cycle / top water level 60 gallons	short cycle/ low water level	
Watering lawn		300 gallons	Early,, shorter watering 150 gallons	
Washing car		50 gallons	Rinse less often 25 gallons	
			Total Water Used	

Please compute the total amount of water used at home before returning it to school tomorrow. Thank you!

Primary Unit

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary

"Water" You Gonna Do About It?

A Culminating Performance Task

Standards

Practical Living: PL-E-3.1.5, Students will understand that here are consumer decisions (e.g. reducing, recycling, and reusing) that have positive impacts on the environment.
Writing: WR-E-1.4, Students will write an informative and persuasive letter for an authentic audience to accomplish realistic purposes.

Activity Description

Students will review information covered during the water unit and use some of that information to write a letter to family members telling what they learned about water and suggesting ways to conserve water at home.

Materials

- Paper and pencil
- Assessment rubric

Length of Lesson

One to two writing periods

Vocabulary Words

All words in the unit

Essential Question

What is water and why is it important?

Guiding Questions

- What are the most important things about water you want to remember?
- Why is it important to conserve water?
- What, specifically, can you and your family do to conserve water?

Skills Used

Organize Reflect Write Communicate

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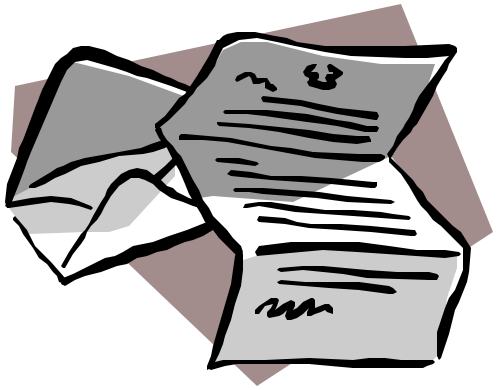
Activity

Step 1: Prior to beginning this culminating activity, develop an assessment rubric to fit the needs of the students who are participating in this activity. A sample rubric is shown on the next page. A copy of the completed rubric should be given to each student once the assignment has been explained in **Step 4**.



Step 2: Tell students to look at all the rain droplets that have been added to the wall throughout this study of water. Ask them to suggest ways the droplets may be sorted. (For example, characteristics of water, animals and plants that live in water, etc.) Begin sorting the droplets and place labels over the different groups.

"Water" You Gonna Do About It?, *continued*

Step 3: After the droplets have been sorted, ask students to think about how the word groups are related to paragraphs. (By adding a topic sentence or by forming a question and adding a concluding sentence, paragraphs can be formed.) Call on different students to show how the droplets can be turned into paragraphs for transactive writing pieces about water.

Step 4: Explain to students that they will be writing a letter to their family telling them the most important things they have learned about water. The letter should tell why students feel the points covered are important and it should also attempt to persuade family members to conserve water usage at home by listing specific suggestions for water conservation. Tell students that the letter should also include reasons why water conservation is important. Remind students that they may use any information from their water learning logs, the water droplets on display in the room and the posters or other art work created during this unit for help with ideas.

Step 5: Pass out copies of the scoring rubric so students have a clear idea of teacher expectations on this final assignment.

Step 6: Give students ample time to reflect on and complete this activity. As the letters are completed, score them, according to the rubric that is being used, make a copy of the letter to place in student writing folders, and send the original letters home for students to share with family members.

Step 7: Pass out water certificates (found on the next page) to students for a job well done!

Step 8: Place water droplets and sentence strips that have been displayed on the classroom wall in a manila envelope labeled "WATER" for students to use throughout the school year to spell the words, for sentence building and for continuing transactive writings.

Step 9: If time allows, encourage students to visit **"http://www.campbell.k12.ky.us/links webquest/earth/water.html"** to do an independent study using the Web Quest, "Water, Water Everywhere".

Letter to Family Rubric

1	2	3	4	Score
May or may not have all 5 parts of a friendly letter, does not recognize purpose or audience.	Letter shows all 5 parts of a friendly letter, recognizes family as audience, shows purpose is to convince family to conserve water, includes no supportive examples from research.	Letter shows all 5 parts of a friendly letter, recognizes family as audience, shows purpose is to convince family to conserve water, includes a few supportive examples from research.	Letter shows all 5 parts of a friendly letter, recognizes family as audience, shows purpose is to convince family to conserve water, and provides at least 4 supportive examples from research.	

This is to certify that

_____

is now an official

Kentucky Water Explorer and

protector of one of Earth‘s most precious natural

resources — WATER!

_____

_____

Thank You

This is to certify that

_____

is now an official

Kentucky Water Explorer and

protector of one of Earth‘s most precious natural

resources — WATER!

_____

_____

Thank You

Kentucky's Commonwealth of Water – Be a Water Explorer
Primary*

Primary Water Unit Reading Resource List

A Drop of Water	By Walter Wick
All About Rivers	By Jane Emil
All About Water	By Melvin Berger
A River Ran Wild	By Lynne Cherry
Around the Pond	By Lindsay Barrett George
Beavers and Their Homes	By Deborah Chase Gibson
Box Turtle at Long Pond	By William T. George
Canoe Days	By Gary Paulsen
Come a Tide	By George Ella Lyon
Come Back, Salmon	By Molly Cone
Daddy and Me	By Catherine Dalyl-Weir
Dawn	By Uri Shulevitz
Drip! Drop! How Water Gets to Your Tap	By Barbara Seuling
Gone Fishing	By Earlene Long
Fishing at Long Pond	By William T. George
Frogs, Toads, Lizards and Salamanders	By Nancy Parker and Joan Richard Wright
I Am Water	By Jean Marzollo
Keeper of the Sea	By Kimberley Smith Brady
Letting Swift River Go	By Jane Yolen
Listen to the Rain	By Bill Martin, Jr.
Little Cloud	By Eric Carle
My River	By Shari Halpern
On a Wintry Morning	By Dori Chaconas
Ponds and Streams	By John Stidworthy
Pond Year	By Kathryn Lasky
Rain	By Peter Spier
Rain	By Manya Stojic
Red Rubber Boot Day	By Mary Lyn Ray
River Life	By Barbara Taylor
River Story	By Meredith Hooper

 * Please note that not all books on this list are included in the PRIDE list approved for purchase. See http://www.kypride.org/ for that list.

Primary Water Unit Resource Reading List, *continued*

Rosie's Fishing Trip	By Amy Hest
Salamander Rain, A Lake and Pond Journal	By Kristin Joy Pratt-Serafini
Snow	By Uri Shulevitz
Swift Rivers	By Cornelia Meigs
Tale of a Tail	By Judith Z. Bodnar
The Caterpillar and the Polliwog	By Jack Kent
The Clean Brook	By Margaret Farrington Bartlett
The Cloud Book	By Tomie DePaola
The Drop in My Drink: The Story of Water	By Meredith Hopper
The Lost Lake	By Allen Say
The Magic School Bus at the Waterworks	By JoAnna Cole
The Raft	By Jim LaMarche
The River	By David Bellamy
The Salamander Room	By Anne Mozer
The Water's Journey	By Eleonore Schmid
Three Days on a River in a Red Canoe	By Vera Williams
Trout Summer	By Jane Leslie Conly
Water Dance	By Thomas Locker
Water Music: Poems for Children	By Jane Yolen
Water, My First Nature Book	By Adrienne Soutter
Water's Way	By Lisa Westberg Peters
Water, Water Everywhere	By Melvin Berger and Gilda Berger
Where Fish Go in Winter	By Amy Goldman Koss
Where the River Begins	By Thomas Locker
Who Sank the Boat	By Pamela Allen

Songs for Primary Water Unit

Keep It Clean
(tune: "**Bingo**")

We use water every day
In many different ways.
W-A-T-E-R
W-A-T-E-R
W-A-T-E-R
We need to keep it clean

Repeat, substituting a handclap for the W, then the W-A, etc.
Reprinted from Earth Children 2000 by Kathryn Sheehan and Mary Waldner, Ph.D., Council Oak Books

Did You Ever See a Goldfish
(tune: "**Did You Ever See a Lassie** ")

Did you ever see a goldfish, a goldfish, a goldfish,
Did you ever see a goldfish go this way or that?
Go this way or that way or that way or this way,
Did you ever see a goldfish go this way or than?

(substitute other fish for goldfish in additional verses)
by Monica Edwards

Rain Song
(tune: "**If You're Happy and You Know It**")

First a little drop of rain hits the ground (tap, tap)
Then another drop of rain hits the ground (tap, tap)
Then another and another and another and another
And pretty soon we heard a different sound (splash, splash)

The Water Cycle Song
(tune: **"Clementine"**

Evaporation, Condensation, Precipitation is what I say.
It is called the water cycle and it happens every day.